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In the summer of 2002, evaluative testing was undertaken at a large multicomponent site for the purpose of evaluating the potential of this site to yield significant information about the prehistory and history of the Pinon Canyon Maneuver Site (PCMS). The work was conducted under cooperative agreement between the National Park Service, Midwest Archeological Center (MWAC) and Fort Lewis College (FLC). The site, 5LA3421, was divided into four areas for the purpose of this project. Archeological investigations at the site included surface mapping, surface artifact collection, geophysical surveys and limited site testing. This very large site possesses several cultural components. The two that are the best documented and received the bulk of the investigations are an early 19th century homestead and a Late Prehistoric Stage habitation site. An earlier prehistoric component was identified in test units and in shovel tests, but the date of this component has not been determined although it is possible that it dates to the Middle Archaic. Magnetic susceptibility tests provide further support for the presence of buried soils in some areas of the site. The geophysical surveys added to the documentation through the identification of pathways and concentration of buried artifacts that imply specific activity areas. Archival research of the GLO platt maps shows the land was patented by Henry LePlatt in 1927. Evaluative testing combined with surface investigations and geophysical surveys demonstrate that the site has a great potential to yield significant information about the history and prehistory of the PCMS, and it is recommended that the site is eligible for nomination to the National Register of Historic Places (NRHP).

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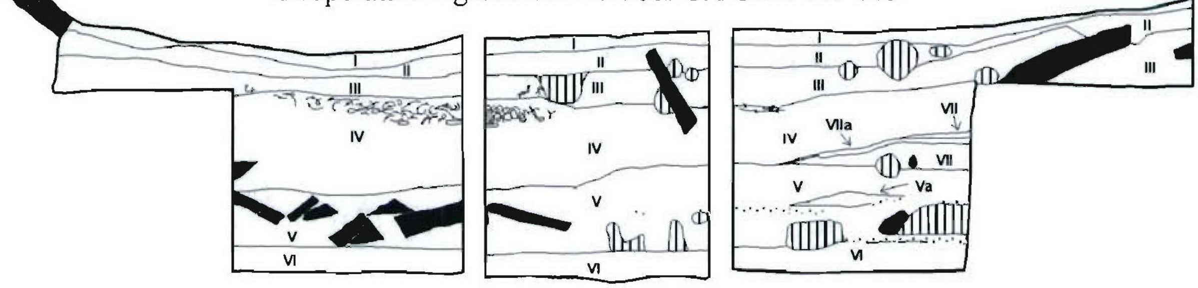
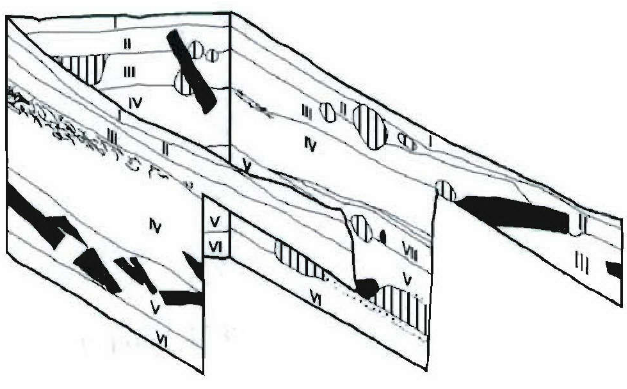
Cooperative Agreement Number CA-6000-A9-003





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FOREWORD

The archeological investigations reported in this manuscript are an important part of the Fort Carson Cultural Resources Management Program. The goal of the program is to maintain the largest possible area for military training while protecting significant cultural and environmental resources. The evaluative testing of Site 5LA3421 is part of an integrated plan that takes a long-term systematic approach to meeting identification, evaluation, and resource protection requirements mandated by the National Historic Preservation Act. While meeting legislated requirements, this project also provides a valuable contribution to our knowledge of the prehistory and resources of Las Animas County, Colorado. Through an Interagency Service Agreement, the National Park Service, Midwest Archeological Center (MWAC), assists Fort Carson in accomplishing its cultural resources goals and meeting its legal obligations. Fort Lewis College completed the reported project under a cooperative agreement with the MWAC.

Fort Carson began cultural resource studies on the Pinon Canyon Maneuver Site in 1983, immediately following the purchase of these lands. The Cultural Resource Program takes a multidisciplinary approach, combining archeological theory and historical methods with geological, geomorphological, botanical, and statistical techniques and procedures in order to focus its efforts to locate, evaluate, and protect significant cultural resources. Professional studies and consultations with Native American tribes have resulted in the identification of National Register of Historic Places eligible sites and districts. The cultural resources of Fort Carson and the Pinon Canyon Maneuver Site represent all major prehistoric and historic cultural periods recognized in the Great Plains and Rocky Mountains. Sites of the Paleoindian, Archaic, and Ceramic stages are present as are sites from the Fur Trade era, 19th century Hispanic and Euroamerican settlements, early 20th century homesteading and ranching, and World War II and Cold War era military sites. The project reported here completes the second phase of the archeological inventory program - evaluative testing of archeological sites to determine their National Register of Historic Places (NRHP) eligibility.

The Cultural Resources Management Program is in the Directorate of Environmental Compliance and Management (DECAM), which is tasked with maintaining Fort Carson's compliance with federal, state, and local environmental laws and mandates. The DECAM holistic management philosophy holds that all resources are interrelated. Decisions affecting one resource will impact other resources. The decisions we make today will affect the condition of Department of Army lands and resources for future training, research, and recreation. Mission requirements, training resources, wildlife, range, soil, hydrology, air, and recreation influence cultural resource management decisions. Integrating compliance and resource protection concerns into a comprehensive planning process reduces the time and effort expended on the compliance process, minimizes conflicts between resource protection and use, allows flexibility in project design, minimizes costs, and maximizes resource protection.

Federal laws protect the resources on Fort Carson and the Pinon Canyon Maneuver Site. Theft and vandalism are federal crimes. Protective measures ensure that Army activity does not inadvertently impact significant cultural and paleontological sites. Fort Carson does not give out site location information, nor are sites developed for public visitation. Similar resources are located

in the Picketwire Canyonlands, where public visits can be arranged through the U.S. Forest Service, Comanche National Grasslands, in La Junta, Colorado.

Fort Carson endeavors to make results of the resource investigations available to the public and scientific communities. Technical reports on cultural resources are on file at the Fort Carson Curation Facility (Building 2420) and the Colorado State Historic Preservation Office. They are also available through the National Technical Information Service, Springfield, Virginia. Selected reports have been distributed to public libraries in Colorado. Three video programs produced by Fort Carson are periodically shown on Public Broadcasting Stations. Non-technical reports on the prehistory, history, and rock art of southeastern Colorado have been distributed to schools and libraries within the state.

Fort Carson continues to demonstrate that military training and resource protection are mutually compatible goals.

Thomas L. Warren
Director
Directorate of Environmental Compliance and Management
Fort Carson, Colorado
March 2004

POPULAR ABSTRACT

The archeological resources of the Pinon Canyon Maneuver Site (PCMS), located in Las Animas County, Colorado, have been intensely studied since the land was purchased by the Army in the 1980s. Before this, several important archeological sites in the near vicinity were identified and a few have been excavated by professionals as well as by amateurs. Sites within and surrounding the PCMS have been inhabited since approximately 10,000 years ago. The earliest prehistoric natives lived off wild plants and game including now extinct megafauna, and were nomadic, after which they remained dependent on wild animals but incorporated more plant remains into their diet. The majority of the archeological sites; however, date from the period known as the Late Prehistoric Stage, which began about A.D. 100 and ended around A.D. 1725. During this time, the prehistoric natives constructed houses made of both hide, wood, and stone, and often settled in suitable rockshelters. This lifestyle changed dramatically in the 18th and 19th centuries when Anglo and Hispanic populations settled the area. The indigenous populations were removed from the land and forced onto reservations. The land where the PCMS is located was sold or was homesteaded by a few hardy Hispanic and Anglo people (several of the Anglo residents were recent European immigrants) who sought a living farming and ranching. By the late 1800s, economic and natural factors lead to the change from small homesteads to larger ranches. The American "Dust Bowl" in the 1930s caused many of these remaining people to sell their lands or to let the land go back to the government for back taxes. Effectively, these actions resulted in a few landowners owning large parcels. In 1983, the U.S. Army acquired the land to use for mechanized maneuvers. One large site, 5LA3421, tested by Fort Lewis College during the summer of 2002 revealed both prehistoric and historic components with the latter attributed to an early 20th century homesteader by the name of Henry Leplatt.

TECHNICAL ABSTRACT

In the summer of 2002, evaluative testing was undertaken at a large multicomponent site for the purpose of evaluating the potential of this site to yield significant information about the prehistory and history of the Pinon Canyon Maneuver Site (PCMS). The work was conducted under cooperative agreement between the National Park Service, Midwest Archeological Center (MWAC) and Fort Lewis College (FLC). The site, 5LA3421, was divided into four areas for the purpose of this project. Archeological investigations at the site included surface mapping, surface artifact collection, geophysical surveys and limited site testing. This very large site possesses several cultural components. The two that are the best documented and received the most attention are an early 20th century homestead and a Late Prehistoric Stage habitation site. An earlier prehistoric component was identified in test units and in shovel tests, but the date of this component has not been determined although it is possible that it dates to the Middle Archaic Period. Magnetic susceptibility tests provide further support for the presence of buried soils in some areas of the site. The geophysical surveys added to the documentation through the identification of pathways and concentration of buried artifacts that imply specific activity areas. Archival research of the GLO platt maps shows the land was patented by Henry Leplatt in 1921. Evaluative testing combined with surface investigations and geophysical surveys demonstrate that the site has a great potential to yield significant information about the history and prehistory of the PCMS, and it is recommended that

the site is eligible for nomination to the National Register of Historic Places (NRHP).

ACKNOWLEDGMENTS

Numerous individuals and organizations contributed to this report. Primary of these are the crew members from the 2002 project. Listed alphabetically, these include Caroline Charles, Sierra Geraci, Haley Harms, Brandon Mathis and Trent Reeder. The crew members endured heat, wind, rain, heat, wind, snakes, heat, cholla wrestling, red ants, heat and wind to make this project the best that it could be. Despite the adversities, the supervisors and crew members thank the National Park Service, Midwest Archeological Center (MWAC) and the Fort Carson Military Reservation (FCMR) for allowing us the opportunity to conduct archeological work at the Pinon Canyon Maneuver Site. We graciously acknowledge Steven DeVore from MWAC for his guidance and support throughout the cooperative agreement. In particular we would like to thank Steve for sharing his knowledge of geophysical surveys with us. Steve suggested the use a magnetic susceptibility study of two profiles. A suggestion that proved to be very important to the interpretation of the site.

We wish to express our appreciation to Randy Korgel of the FCMR for his support and advice, which greatly enhanced the content of this report. Other members of the FCMR staff that aided in this report include Cody Anderson and Kelly Wright, both of whom provided us with archival data which we needed to complete the report. Cody Anderson and Thadd Swan leant a hand in the field. Pam Cowen was of invaluable aid in helping us with the new catalog system for FCMR and the PCMS. Pam's recollection of the 2000 testing phase was of primary importance to our excavations.

We thank Dr. Minnette Church of the University of Colorado at Colorado Springs for sharing her GLO data. Her visit to the site is acknowledged and we appreciate her insights into the archeology of the PCMS. We thank Dr. Richard Krause of the University of Alabama for examining the prehistoric ceramics and giving us his professional opinion. We especially are grateful to Dr. Mary Gillam for spending time with us on the site refining the stratigraphy and helping us identify and understand the more subtle geomorphological influences at work in this location.

Our thanks go to Trent Reeder for the artifact and profile illustrations. Trent's talents and all around good-natured personality made working with him a pleasure. We also acknowledge those individuals who helped us through the laboratory work. These include the following individuals: Cerisa Reynolds, Harmony Driver, Nina Winnemucca, Sierra Geraci, Haley Harms and John Paulick. Amy Nelson stepped in as laboratory supervisor in September of 2003. Her dedication and willingness to tackle the really hard stuff are most sincerely appreciated. Patricia Holm is responsible for all the artifact photographs that appear in this report. Laura Ninnemann finalized the AutoCad maps and her diligence and expertise is expressed in the high quality maps in this report. Haley Harms was indispensable to the success of this report. We are grateful to her for sharing her knowledge of Access Software so that we could efficiently complete the database process and for formatting and finalizing the report.

The staff at the PCMS cantonment facilitated our comings and goings to the PCMS, we are thankful to them for helping us along the way. We shared accommodations with Mark Owens, Bonnie Newman, Roche Lindsey and the New Mexico State University (NMSU) staff at the Red

Rocks Ranch (RRR). We appreciate them sharing their space and their knowledge with us. We thank Mead Klavetter of the RRR for helping with just about everything, including crisis prevention.

Lastly, we thank the Black Hawk helicopter crew for the ride of a life time.

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CHAPTER 1
INTRODUCTION

Introduction

Fort Lewis College (FLC) entered into a cooperative agreement (CA-6000-A9-003) with the National Park Service, Midwest Archeological Center (MWAC) to conduct evaluative testing at archeological site 5LA3421, a large multiple component site on the Pinon Canyon Maneuver Site (PCMS) in Las Animas County, Colorado (Figure 1.1). Field work for the project was conducted over four field sessions from July 6th through August 22rd, 2002 with students and staff from FLC. Work undertaken at the site consisted of surface artifact and feature inventory and recordation, surface artifact collection, mapping, geophysical survey, and limited subsurface testing. The purpose of the investigation was to define more precisely a definitive site boundary, determine if the site were potentially eligible for nomination to the National Register of Historic Places (NRHP), (if recommended as having the potential for nomination to the NRHP) then determine if it was feasible to protect the site *in situ* or if data recovery is required. If data recovery is recommended, then what areas should be concentrated on and what methodology should be used, provide justification and budget estimates for full data recovery. Recommendations are provided in Chapter 11, Conclusions.

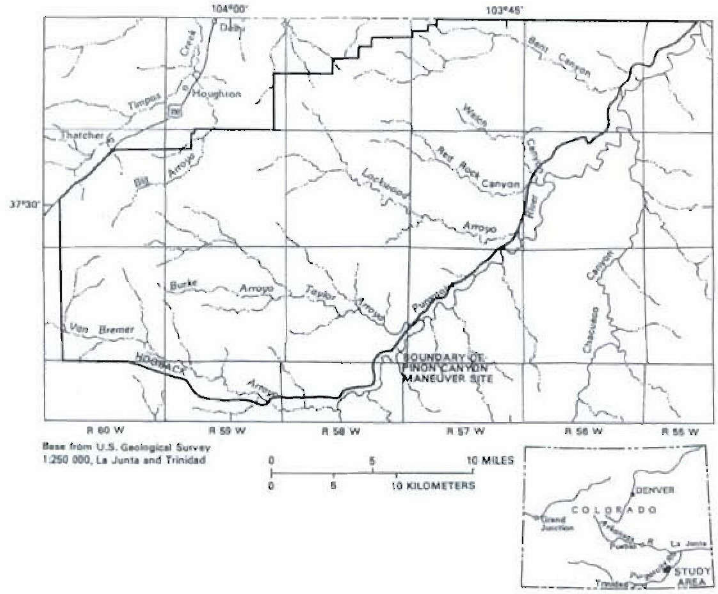


Figure 1.1. Locational map, Pinon Canyon Maneuver Site, Las Animas County, Colorado.

This large multiple component prehistoric and historic site is located along Big Water Arroyo, a tributary of Taylor Arroyo and the Purgatory River in the southeastern portion of the PCMS. A second smaller drainage runs from north to south through the site. This drainage is ephemeral and is unnamed on the Rock Crossing 7.5 minute United States Geographical Survey (U.S.G.S.) quadrangle map (Figure 1.2). The site mostly encompasses a large alluvial terrace above Big Water Arroyo and the top of the sandstone outcrop above the terrace. For management purposes, the site was divided into four areas: Areas A-D. The division between areas was determined by geographical boundaries as well as differences in archeological composition such as the homestead component. The site as investigated by Fort Lewis College included only the area within the protective fence including site 5LA3121. The total area under investigation measures 85,280 m^2 or approximately 20 acres.

The intent of site testing was to determine horizontal and vertical site boundaries, and to determine whether each resource satisfied the criteria for a significant archeological resource as outlined in the previously developed historic context for the Arkansas River Basin in southeastern Colorado (Zier and Kalasz 1999) and in the current research design proposal for the PCMS (Andrefsky and Zier 1988). Specifically, determination of the prehistoric site component to contribute significant knowledge of the prehistory of the PCMS was predicated on the following criteria: Population Dynamics; Technology; Settlement and Subsistence Strategies; and Geomorphology and Paleoclimates. The historical component of the site was evaluated through the following historical research concerns: Chronology; Functional(site type); Settlement; Culture Change and Ethnicity.

The field season consisted of four sessions; one five-day session and three ten-day sessions with a crew size between five and nine. Field work was conducted in accordance with the existing guidelines and procedures established for the PCMS (Dean 1992) and those of the Colorado Historical Society (CHS), State of Colorado Office of Archaeology and Historic Preservation (OAHP). The extent of subsurface testing was reviewed by MWAC personnel. This testing did not exceed the necessary requirements to determine site significance. Laboratory procedures followed those of Dean (1992) involving analysis of collected materials while cataloging and curation followed those provided by DECAM to FLC (Pamela Cowen, personal communication 2003). Report standards followed those of the OAHP, the Directorate of Environmental Compliance and Management (DECAM) and MWAC.

Field techniques employed at the site depended on the goals of the research design. The site was mapped in its entirety; otherwise specific field methods and techniques were adjusted to the goals envisioned for each Area of the site. Surface collection of diagnostic artifacts was carried out in all areas of the site, but with restrictions on the types of diagnostic artifacts collected especially from the historic component. Geophysical prospecting with a gradiometer and a resistance meter were conducted in Areas A and D of the site. Magnetic susceptibility samples were collected from Area D and the cutbank profile on the south

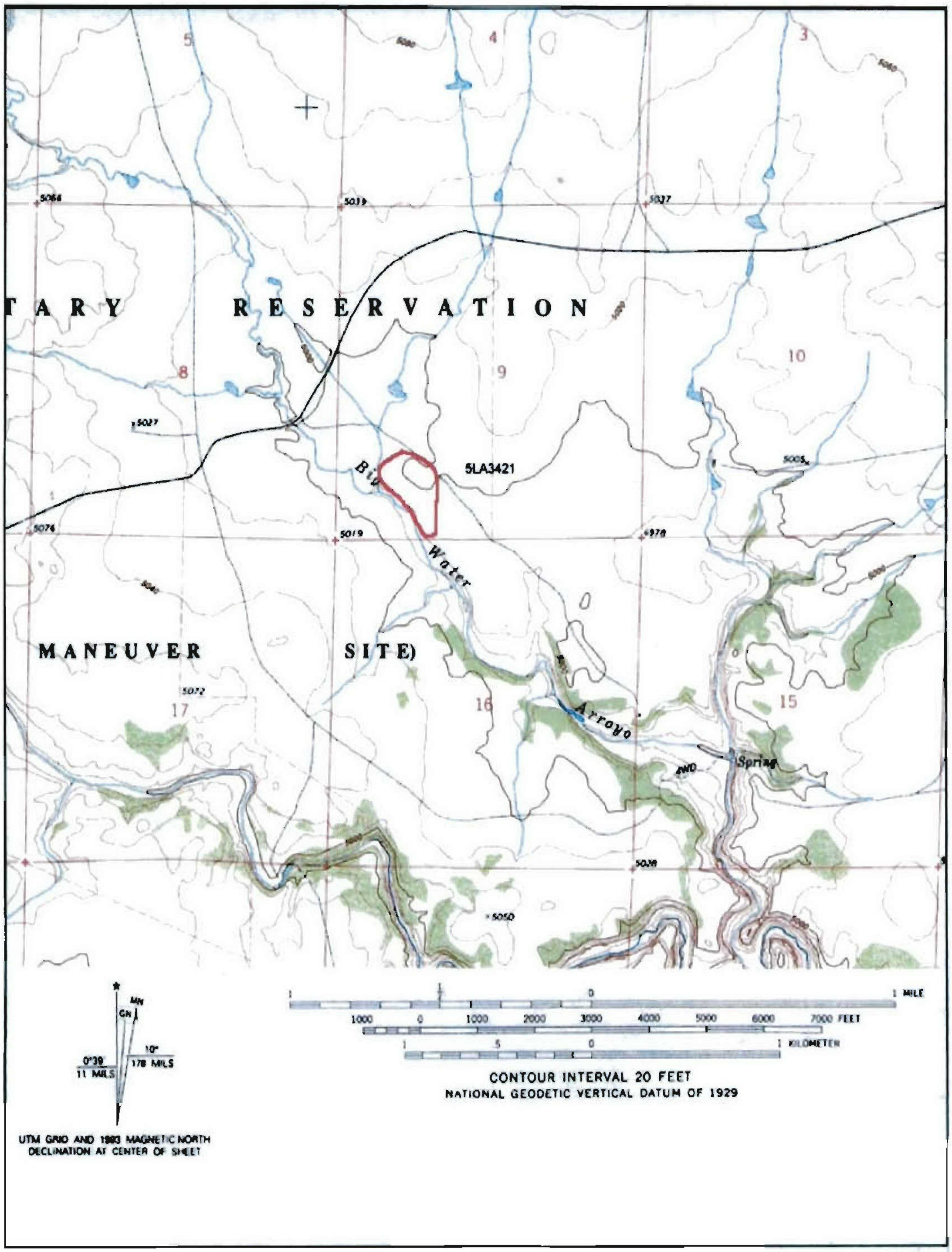


Figure 1.2. U.S.G.S. quandrangle map showing the location of 5LA3421.

bank of Big Water Arroyo. Limited subsurface testing was conducted in three areas (Areas A, C, and D). A fourth area (Area B) was mapped and surface collected but was not tested for subsurface materials. The site was originally recorded in 1984 by the University of Denver (Angulski 1984). It was their recommendation that the site was potentially eligible for nomination to the NRHP. The original site boundaries as recorded in 1984 included Areas B and D of the four areas that were recognized by FLC during the 2002 field season. Intermediate to the work conducted by FLC, archeological investigations by David Kuehn Consulting and New Mexico State University (NMSU) in 2000 resulted in expanding the original boundaries further to the west to include the salient historic component in the southwestern portion of the site as well as a prehistoric artifact scatter further to the north. For the most part, investigations by FLC were confined to the area defined by Kuehn (2002) from a draft map provided to FLC by DECAM. However, in two instances investigations were undertaken just outside the protective fence. The first example was in the historic component where surface inventory and geophysical surveys extended beyond the fence to the west and south to investigate the potential for buried structures or features. Second, four one meter square test units were excavated in the northwestern portion of the site beyond the limits of the protective fence. The test units across the fence were selected for two reasons: 1) this area fell within our random sample, and 2) we needed to establish control samples away from the main artifact concentration to serve as proxy data for the interpretation of the cultural and natural strata.

At the completion of field and laboratory work, the original recommendation that the site was potentially eligible for nomination to the NRHP remained unchanged The significance of the site is defined by Criterion D [36 CFR 60.6]of Section 106 of the National Historic Preservation Act of 1966: the site has yielded, or may be likely to yield, information important in prehistory or history. The presence of stratified cultural deposits in both historic and prehistoric contexts and extending more than one meter below the ground surface strengthens the integrity of the site despite the disturbance to the site, in large part, from tracked military vehicles. It is recommended that certain areas of the site be protected and preserved. These areas are identified and discussed in the text of this report.

Recommendations for further work include the adjustments to the site boundary as well as to the protective fence. This is based on an assessment of the depth of cultural deposits and/or the extent of surface artifacts in specific areas of the site. It is recommended that portions of the site fenced, which should protect those areas from future damage by tactical maneuvers. Further data retrieval is not recommended at the site if avoidance and protection are implemented.

The public interest was well served by the participation of FLC students in this work. Students gained valuable practical experience in all facets of archeological research, and thus this project materially contributed to the educational mission of FLC. The resulting addition to the archeological knowledge of this part of the state benefitted the public in that it has

helped preserve valuable cultural resources and has increased awareness of the rich prehistoric and historic cultural legacy of the nation in general.

This report documents the findings of this evaluative work through twelve chapters and seven appendices. Chapter 1, the Introduction, provides a general overview of the site and the project. Chapters 2 through Chapter 4 describe the natural and cultural settings of the PCMS, and place this present work into its management context. Chapter 5, Site Background and Methodology, describes the field and laboratory methods used for this project. This chapter is general in scope and deviations from the general methodologies described in Chapter 5 are defined in the individual chapters that follow. Also in Chapter 5 we present more detail about the site from its original recording. Chapters 6 through 9 detail the investigations conducted within the separate Areas of the site. Each chapter is independent, with descriptive results from the surface and subsurface investigations and artifact and special sample analyses from each area discussed within their associated chapter. A description of the geoarchaeology of the site is presented in Chapter 10. Chapter 11 provides a brief summary and management recommendations. Chapter 12, references cited, concludes the report. Appendices I through VII provide specific data on magnetic susceptibility, macrobotanical remains, radiocarbon, soil analysis, pollen, faunal remains, and shovel test stratigraphy.

CHAPTER 2
BACKGROUND TO THE STUDY:
THE NATURAL AND CULTURAL ENVIRONMENTS

Introduction

The Pinon Canyon Maneuver Area is located in the plains of southeastern Colorado, just north of the boundary between the Great Plains proper and the Sonoran zone of the Desert Southwest. The purpose of this chapter is to describe the natural and cultural environments of the maneuver area, so that human adaptations, both prehistoric and historic, can be better understood. The first section provides the reader with a synopsis of the Great Plains in general. The next section deals specifically with the natural environment of the PCMS. The final two sections describe the history and prehistory of the PCMS.

The Great Plains of North America

Walter Prescott Webb (1931) described the Great Plains as a land of sun, wind and grass. Covering an area of approximately 450,000 square miles, the Plains stretch from the Rocky Mountains in the west to Iowa and Missouri in the east, from southern Canada in the north to Texas in the south (Wedel 1961).

Physiography

Much of the following synopsis is taken from Wedel (1961). The Plains have low relief. Their elevation ranges from a high of 7,000' in Wyoming and 5,000' in the Colorado foothills to about 2,000' in the eastern boundary. Geologically, the Plains are the result of repeated uplifts of the Rockies which started during the Tertiary Period (65 m B.P.) and extended into the Pleistocene Epoch (2 m B.P.). As the western land increased in elevation, its streams became increasingly active and huge quantities of silt were deposited to the east. This occurred in southern Canada, most of North and South Dakota, Wyoming, Montana, as far east as most of Nebraska and Kansas, to central Oklahoma and central Texas. Streams are easterly flowing. Most water sources are permanent springs and seeps from underground reservoirs. The largest of these is the Ogalalla Formation. There are numerous sand dunes on the Plains, the largest of which are located in central Nebraska north of the Platte River.

Climate

Wind systems are dominated by westerlies. In the central and southern plains, "hot winds" can blow at temperatures over 100^0 F. In the winter, the southerly movement of the jet stream brings with it the cold Arctic air-mass to move south, creating cold temperatures. Upper temperature readings decrease and lower readings increase from south to north. Annual temperature means vary from 65^0 F in Texas to 35^0 F in Canada. Extreme summer highs of 110^0 F are found, however, in both Texas and southeast Alberta. Minimums of -16^0 F in Texas and -55^0 F in Canada are recorded.

Average annual precipitation on the plains has a high of 40" in southeast Kansas, and lows of 14" in easterly Colorado and New Mexico and 10" in southeast Alberta and southwest Saskatchewan. There is much local variation due to elevation. For example, the Black Hills of South Dakota have 6-8" more precipitation per year than surrounding areas. Summer precipitation comes mostly in the form of heavy late afternoon thunderstorms which creates puddling so that most moisture is lost through transvaporation before it can seep into the soil. In the winter, especially in the central and northern plains, heavy winter snowstorms are common.

This climate severely restricts the ability to grow crops. The number of frost-free days in the southern and central plains tend to range between 140-200, whereas in the northern plains, the number drops to below 100. The problem with growing crops is that drought increases as one goes south; cold increases as one goes north.

Flora and Fauna

The dominant grassland biome characteristic of the plains is created by the combination of high evaporation from the constant winds and low precipitation. Fire (both natural and human-caused) also was a factor, as was the action of ungulate grazing; the importance of these are debated still (Arthur 1975).

Two major grass types exist on the plains: shortgrasses and tallgrasses. Shortgrasses are characterized by short stems and roots, and quick growth with little moisture. They hold their nutritional content through the dormant winter period and therefore provide good winter forage. The tall-grasses have long stems and roots (up to 6' for each). They are found in areas of higher precipitation such as along foothills and the eastern margins.

The dominant fauna of the plains was the American bison (Bison bison bison), until massive EuroAmerican settlement in the 19th century drove the animal almost to extinction. It provided aboriginal groups with food, and materials for clothing, utensils, glue, bindings, and tipi covers. Although their migratory behavior was formerly denied (Roe 1951), it is now fairly widely accepted that herds engaged in small-scale, localized migrations (McHugh 1958). Other animals native to the Plains included the antelope, deer, wolf, kit-fox, jackrabbit, Plains grizzly, various birds, fish in the major rivers, and shellfish (primarily mussel).

Paleoenvironments

Two models for paleoenvironments in North America are available. The first, proposed by Antevs (1955), envisages climatic change as slow and gradual. Consequently, he defined only three major climatic episodes for the Holocene (or Neothermal, in his climatic classiciation system): (1) Anathermal (10,150-7,000 B.P.); (2) Hypsithermal (7,000-4,500 B.P.); (3) Medithermal (4,500 B.P.—present).

This model was replaced by one based on the European Blytt-Sernander model of

short periods of climatic stability interrupted by rapid change to new stable states (Wendland and Bryson 1974): (1) Late Glacial 13,000-10,500 B.P; (2) Boreal 10,500-9,500 B.P.; (3) Atlantic 9,500- 5,000 B.P.; (4) Sub-boreal 5,000-3,500 B.P.; (5) Sub-Atlantic 3,500 B.P.-A.D. 400; Scandic A.D. 400- 900; (6) Neo-Atlantic A.D. 900-1200; (7) Pacific I A.D. 1200-1450; (8) Pacific II A.D. 1450-1550; (9) Neoboreal (Little Ice Age) A.D. 1550-1850; (10) Recent A.D. 1850-present. There is, however, much regional variation in the dating and severity of these episodes, because of their transgressive nature (Wilson 1988), and, therefore, local studies are necessary for any intensive study of human-environment relationships.

The Natural Environment of the Pinon Canyon Maneuver Site

Physiography

The PCMS comprises approximately 243,000 acres (380 square miles) of rugged country in Las Animas County, southeastern Colorado. It is located at the edge of the plains grasslands, and is close to two other major physiographic regions: the Rocky Mountains, specifically the Sangre de Cristo Range to the west and the Raton Mesa uplift to the south; and the American Desert Southwest (Weber 1988: XVII-2). The PCMS is comprised of four physiographic zones: plains, upland mesas, arroyos and canyons, and an uplifted basaltic outcrop called the Hogback.

Geology and Geomorphology

A generalized description of the geology and geologic structures from the PCMS is extracted from several major sources. These sources include the geologic and structure contour map of the La Junta Quadrangle (Scott 1968), and the geologic map of the Trinidad Quadrangle (Johnson 1969). Detailed information on the local geology was obtained from two principal sources; a report of the hydrology of the PCMS by the U.S. Geological Survey (von Guerard et al. 1987), and the geomorpohological and geoarcheological investigations of the PCMS (Schuldenrein 1985). These documents were of value for their descriptions of the local geophysical environment. Two maps and one table were selected from these reports to include in the following discussion.

Lithology A generalized chart of the geologic stratigraphy is presented in Table 2.1. The oldest formations identified in the PCMS are of Permian, Triassic, and Jurassic ages, and they are exposed only in the deeply dissected canyons and along the Purgatoire River Valley. These rocks consists of sandstones of the Entrada Formation, an ancient dune deposit, limestones and claystone of the Ralston Creek Formation, and the varicolored claystones and limestones of the Morrison Formation. The Morrison Formation is Jurassic in age and was deposited on an expansive floodplain that was built up by streams carrying clastic sediments off the mountains to the west during the Nevadan orogeny.

Table 2.1. Generalized Geologic Chart, PCMS. Taken from von Guerard, et al. 1987:11.

System	Series	Formation	Member	Approximate thickness (m)	Physical Description
Quaternary	Holocene	Alluvium		Variable	Gray, poorly sorted stony sand and silt forming flood plain
Tertiary	Pleistocene	Dune sand		Variable	Yellow, fine-grained sand, forming localized dunes
	Oligocene and Eocene	Basic plugs, dikes and sills			Dark gray, finely crystalline, olivine, basalt dikes
Cretaceous	Upper Cretaceous	Niobrara	Smoky Hill Shale Member	Variable	Yellowish-gray, fossiliferous, calcareous shale and silty limestone
			Fort Hays Limestone Member	15 - 18	Beds of chalk .15 to 1 m thick separated by beds of dark-gray chalky shale 2.5 52 cm thick
		Carlile Shale	Codell Sandstone Member	1.5 - 7	Upper part is thin lenses of dark limestone interbedded with a limey shale. Basal .75 to 1 m is a dense, near-black, fossiliferous limestone
			Blue Hill Shale Member	20 - 25	Dark fissile shale with large calcareous concretions
			Fairport Chalk Member		Tan to black, chalky, calcerous shale
		Greenhorn Limestone	Bridge Creek Limestone Member	9 - 12	Interbedded, fossiliferous limestone and limey shale
			Hartland Shale Member	7 - 9	Light gray limey shale with thin beds of Bentonite
			Lincoln Limestone Member	4.5 - 9	Limey shale with platy limestone beds near base and top
		Graneros Shale		27 - 45.5	Dark gray to black, fissile, noncalcareous shale, with two beds of dense, dark limestone
	Lower Cretaceous	Dakota Sandstone		22.5 - 42.5	Yellowish brown, crossbedded cliff-forming sandstone
		Purgatoire Formation	Kiowa Shale Member	12 - 21	Fossiliferous, marine, dark-gray, claystone, siltstone and sandstone
			Cheyenne Sandstone Member	21 - 33.5	Massive white to yellowish brown, crossbedded sandstone
Jurassic	Upper Jurassic	Morrison Sandstone		30.5 - 91.5	Varicolored claystone, brown weathering sandstone and gray sandstone
		Ralston Creek Formation		6 - 15	Greenish gray claystone, gray limestone with jasper and agate
		Entrada Sandstone		6 - 30	Massive, white crossbedded sandstone
Triassic and Permian		Undivided			Mostly reddish brown sandstone and shale with dolomite and limestone

The most prominant lithologies in the PCMS, however, are Cretaceous in age, and consist of sandstones and limestones interbedded with shales. The Lower Cretaceous Purgatoire and Dakota Sandstone Formations outcrop over a large portion of the PCMS. The Purgatoire Formation consists of two members - Cheyenne Sandstone and Kiowa Shale. Cheyenne Sandstone is a white to yellowish brown, cross-bedded, massive sandstone. It ranges from 40 ft to 70 ft thick. It is exposed as white cliffs along the Purgatorie River. It is distinguished from the Dakota Sanstone by its whiter color and more rounded weathered form. The Kiowa Shale is a fossiliferous, marine dark-gray claystone. This is locally exposed in the deeper reaches of the Purgatoire River Canyon.

The Purgatoire Formation is overlain by the the Dakota Sandstone. This sandstone is a yellowish brown, cross-bedded sandstone that has weathered into steep ledges and cliffs that form the rim of the Purgatoire River canyon and many of the other canyon rims (von Guerard et al., 1987:9). Surface exposures are often coated with manganese oxides or desert varnish. The Dakota Sandstone was formed by a major transgression of the Cretaceous seas. It is a beach facies and often contains hard, dark-brown ironstones. Some exposures also contain chert and chalcedony pebbles. The formation ranges between 75 ft and 140 ft thick. In particular, the Dakota Sandstone outcrops along most of the canyon rims and underlies the shallow soils over most of the PCMS. This formation along with the desert varnish which has forms on the surface provides the canvas for most of the extensive rock art found in the PCMS.

Overlying the Dakota Sandstone and Purgatoire Formation and comprising the major rock of the western and northern sections of the PCMA are the light to dark gray noncalcareous shales and fossiliferous limestones of the Upper Cretaceous. These include the Carlile Shale, Greenhorn Limestone, and Graneros Shale. These formations were deposited during a major transgression of the Cretaceous seas about 100 million years ago. These formations consist of several members (Table 2.1). These sediments were laid down in deeper waters as the Cretaceous seas continued to advance north and east across the continent. The Upper Cretaceous Niobrara Formation flanks outcrops along the highest ridges in the northwestern part of the PCMS. Comprised of two members, the formation consists of beds of chalk separated by beds of dark-gray chalky shale and overlying yellow-gray, fossiliferous calcareous shale and silty limestone.

The most recent lithology in the PCMS are two eastward trending dikes. The larger of the two is the Hogback. The Hogback is located at the extreme southeastern boundary of the PCMS. A smaller dike is located west of the Hogback. Both dikes are composed of dense, dark, olivine basalt (Scott 1968).

Geomorphology The PCMS is divided into four major landscape units: Hills, Steppes, Hogback, and Arroyo/Canyon (Schuldenrein 1985). The Hills landscape unit includes the Black Hills, the Big Arroyo Hills, and the Bear Spring Hills. This landscape unit contains

more varied terrain than any other unit because it consists of steep slopes, pediments, and heavily dissected hill slopes. The Steppe landscape unit is level to slightly sloping grasslands and mixed pinyon and juniper forest that covers most of the PCMS. The Hogback, a basaltic dike, is bounded by the Van Bremer Arroyo and its tributaries and is shaped by erosional activity on a steeply tilted cuesta. The Arroyo/Canyons landscape unit includes the slopes and bottoms of the major drainages in the PCMS.

The above landscape units are subdivided further into eight landform categories (Schuldenrein 1985:70). These categories include:

* heavily eroded, stripped steppes and ery steep slopes,
* broad steppes,
* graded pediments or gently sloping steppes,
* alluvial fills and terraces,
* the Hogback and its steep slopes,
* the loessic plains at the western edge of the PCMS,
* the sandy terrains below the Big Arroyo Hills, and
* escarpments and cliffs.

Bedrock Structure The prevalent structural pattern for the region as a whole and including the PCMS is the gently dipping, subhorizontal sedimentary bedrock pitch at the western edge of an east - west trending axis. Exceptions to this major structural feature in the PCMS include the Black Hills double monocline and the Hobgack dike.

Hydrology The PCMS is drained principally by the Purgatoire River which flows along the eastern edge of the maneuver area. Five main arroyo systems and numerous smaller systems are present in the PCMS. The five major systems from south to north are Van Bremer, Taylor, Lockwood, Red Rocks and Bent Canyons. Like most drainage patterns the local pattern is directly tied to the underlying bedrock structure. The fracture or joint lineaments, of which there are two major lineaments, are oriented north to northwest. The fracture joints have important implications to archeology because they are sources of groundwater entrapment, springs and rock shelters.

Soils There is limited soil development across the PCMS—the product of prevalent long-term aridity. Two major soil orders are present in the PCMS. These are the loessic Entisols in the area east of Simpson, CO., along the western edge, and the Aridisols which cover most all of the PCMS. Both soil orders possess weak "A" soil horizons and clay enriched Soil "B" horizons. Two aridisols occur in the project area and are mapped by the U.S.S.C.S. (1983). One soil is typically found on shale bedrock toward the northern end of the PCMS. This soil profile is a shallow, weak "A" horizon with little organic matter overlying an even weaker "B" horizon. These soils are usually as old as the alluvial fills of the arroyo. They may represent most of the Upper Quaternary. A second soil is formed over sandstone bedrock, and covers most of the project area. Based on soil development, geomorphological position

and radiocarbon dating, the PCMS experienced periods of eolian deposition in the late Pleistocene and Altithermal, and at least four periods of alluvial deposition, one pre-9,080 B.C. and three threreafter (McFaul and Reider 1988a: III-20).

Climate

The climate at the PCMS is classified as a cold, middle latitude, steppe climate (McFaul and Reider 1988b: II-3). January is the coldest month, with an average of -1.4^{0}C at Rocky Ford, 75km to the northeast (McFaul and Reider 1988b: II-3). Winter temperatures are ameliorated by sporadic winter chinooks. Precipitation averages 292mm at Rocky Ford, with May being the wettest month (McFaul and Reider 1988b: II-3).

Flora and Fauna

Approximately 350 plant species are identified in the PCMS. These are organized into four grassland communities, 16 shrubland communities and six woodland communities (Van Ness and Kalasz 1988: II-14). These provide a very wide range of resources both for consumption and other purposes (Van Ness and Kalasz 1988: II-30-41). A similarly wide variety of fauna have been identified in the PCMS. Large ungulates include mule deer and pronghorn antelope. North American bison once roamed the area.

The Cultural Setting

The purpose of this section is to place the FLC work in its research and management perspective. However, it is not intended to serve as a redundant reworking of the comprehensive syntheses of PCMS archeology that have been produced earlier (Andresfky 1990). Readers are encouraged to refer to these syntheses, which are noted below, for detailed information on the archeology of the PCMS, as well as to Athearn's (1985) excellent historical review of southeastern Colorado.

Plains Archeology

The archeology of the PCMS, for obvious reasons, cannot be separated from Plains archeology. Historical overviews of the development of the latter are found in Frison (1973), Wedel (1983), and Duke and Wilson (1995a). The following section draws heavily from these three works, as well as from others that are referenced as appropriate.

Plains archeology was a relatively late entry into American anthropology, probably for two reasons. First, it lacked the monumental structures which had attracted early students to places like the Southwest. Secondly, influential early anthropologists, from Wissler to Kroeber, had declared the region uninhabitable prior to the acquisition of the horse (Frison 1973: 151).

Throughout the 1920s, some archeologists began working in the Plains. However, there was no systematic investigation or excavation, and some strange theories prevailed, for example the Welsh influence among the Mandan of the Middle Missouri region (Frison

1973). This attitude changed as a result of the number of early human finds found in the area which put Plains archeology in the forefront of this study in the 1930s. Sites like Lindenmeier and Dent in Colorado, together with Clovis and Folsom in New Mexico were recovered in this decade. Also, during this decade, theoretical contributions from Strong and Wedel and Krieger helped Plains archeology gain a national stature (Duke and Wilson 1995a: 3). Plains archeology, for a while, became a "high-status" area of study. The second boost to Plains archeology came as a result of the possible loss of thousands of archeological sites in the Missouri River floodplain through reservoir construction for recreation, storage, and hydro-electric facilities. Plains archeology became for a critical part of its life dominated by salvage archeology concerns (Frison 1973).

Government involvement in Plains archeology received a further boost in the 1960s with the modern era of cultural resource management. However, because large portions of the plains are privately owned and therefore not under the jurisdiction of federal conservation laws, the importance of archeological studies of huge areas like the PCMS take on additional importance.

It is true to say that Plains archeology has been dominated by the practical necessities of dating sites and erecting spatio-temporal frameworks (Duke and Wilson 1995a). Despite the early important theoretical contributions of Plains archeologists like William Duncan Strong (1935) and Waldo Wedel (1936), Plains archeology has never flirted with archeological theory for its own sake. Nevertheless, elements of processualism have become important mainstays of much contemporary Plains archeology, whether it be Ahler (1970), Calabrese (1972), Johnson (1988), Bamforth (1988), or Kelly and Todd (1988). Even postprocessual studies have made their way onto the Plains (Duke and Wilson 1995b). Nevertheless, these studies all seem to have been driven by the primary need to understand the prehistory of the Plains, rather than using the Plains merely as a testing ground for proposed theoretical contributions to the discipline at large.

Southeastern Colorado Archeology

The purpose of this section is not to repeat the well documented syntheses provided by Anderson (1988), Cassells (1983), Eighmy (1984), and Zier and Kalasz (1999) for southeastern Colorado. However, it is necessary to "set the scene" as it were, so that the specific resources discussed and evaluated in this report may be better understood.

The cultural taxonomies and classifications used in southeastern Colorado are an implicit amalgamation of taxonomic systems proposed by McKern (1939) and Willey and Phillips (1958). Thus, we note the interchangability of McKern's "focus" and Willey and Phillips's "phase" concepts throughout much Plains archeological writing (see also Chomko et al. 1990: 9). The terms stage and period have also become virtually synonymous. This is particularly apparent in discussion of the Archaic, a confusion that has been fueled by the use of the term "Archaic" by Frison (1978) for the Middle Prehistoric Period. While this interchange is acceptable for Wyoming, where the Altithermal of the early Middle Prehistoric

Period created the need for Archaic-stage adaptations, it is less applicable elsewhere in the northern Plains, where a commitment to large animal hunting may have continued unabated, despite the stress caused by Altithermal climatic deterioration.

It is fair to say that understanding the processes behind the patterns that constitute the culture-historical sequences of southeastern Colorado are still essentially unknown. For example, although lengthy discussions on the (dis)similarities between projectile points and other diagnostic materials have been made by numerous workers (e.g. Gunnerson 1987), there has been less discussion on whether these patterns are the result of migration, diffusion, or other cultural factors. Point styles seem to constitute distinct horizon styles that cross-cut other cultural boundaries, and it is clear that an adequate understanding of the area's prehistory cannot be completed until these factors have been evaluated.

The PCMS is part of the southeast Colorado cultural unit as defined by Eighmy (1984) and more recently defined as part of the Arkansas River Basin (Zier and Kalasz 1999). Eighmy (1984: 10) divides the chronology of this unit into four periods; Paleo Indian, Archaic, Ceramic, and Protohistoric/Historic. In previous reports of our work at the PCMS (Charles et al. 1996), we used Eighmy (1984) and Lintz and Anderson (1989) as our primary organizational frameworks. However, we are persuaded by Zier and Kalasz's (1999:69) recent reworking of Eighmy's basic schema based on new data and a clarification of the criteria used to distinguish between different taxa (Table 2.2.). Their reworking retains the Paleo Indian and Archaic terms as stages, and replaces the Ceramic period with the Late Prehistoric stage. The Protohistoric period is dated to AD1450-1725. In the following synthesis we use the dates for these stages and periods as suggested by Zier and Kalasz (1999:69).

Paleo Indian Stage The Paleo Indian stage, which dates from approximately 11,500 BP to 7800 BP, is a well-documented phenomenon the Colorado Plains, the area producing many significant finds. The Paleo Indian stage straddles the transition from terminal Pleistocene to early Holocene environments with an accompanying change in fauna and flora. It is typified by nomadic hunters and gatherers concentrating on the killing of large fauna, such as mammoth and now-extinct forms of bison. The Paleo Indian stage is divided into the Pre-Clovis (>11,500 B.P.), Clovis (11,500-10,950 BP), the Folsom (10,950-10,250 BP), and the Plano (10,250-7800 BP) periods. Although both Clovis and Folsom periods are identified by distinctive fluted points, the processes of transition between the two are unclear, and Frison et al. (1991) have proposed a transitional Goshen complex. The Plano period is characterized by a proliferation of point types, which may reflect increased territoriality and technological specialization as greater resource stability preempted the need for long-distance interaction networks (Hayden 1982:119).

The presence of humans in southern Colorado and surrounding areas during the Paleo Indian stage is represented primarily by surface finds (for example, there are two Folsom finds on the Chaquaqua Plateau [Campbell 1976]). This area is close to the Folsom type-site, located just southeast of Raton, New Mexico. Within 200 miles of FCMR are the

Table 2.2. Cultural taxon and temporal ranges for Southeastern Colorado. Defined by Zier and Kalasz (1999).

Cultural Taxon	Temporal Range
Paleo Indian Stage	>11,500 - 7800 B.P.
Pre-Clovis Period	>11,500 B.P.
Clovis Period	11,500 - 10,950 B.P.
Folsom Period	10,950 - 10,250 B.P.
Archaic Stage	7800 - 1850 B.P.
Early Archaic Period	7800 - 5000 B.P.
Middle Archaic Period	5000 - 3000 B.P.
Late Archaic Period	3000 - 1850 B.P.
Late Prehistoric Stage	1850 - 225 B.P.
Developmental Period	1850 - 900 B.P.
Diversification Period	900 - 500 B.P.
Apishapa Phase	900 - 500 B.P.
Sopris Phase	900 - 750 B.P.
Protohistoric Period	500 - 225 B.P.

well-known Paleo Indian sites of Cattleguard, Lindenmeier, and Jurgens. The bison-kill site of Olsen-Chubbuck (Wheat 1972) is also relatively close, and it is likely that more Paleo Indian sites will be found in the future.

The Paleo Indian stage is manifested on the PCMS by isolated Folsom and Plano materials (Ahler 2002; Andrefsy and Zier 1988: VIII-3). At the Barnes Site, 5LA9187, two pieces of a broken Folsom point were recovered from the surface during an archeological survey. Subsequent testing and geoarcheological trenching failed to identify a possible buried Paleo Indian component. A broken Folsom point was apparently collected from 5LA3421 during an earlier testing phase (Kuehn 2002). Several Plano projectile points have been recovered from the PCMS (Lintz and Anderson 1989; Zier and Kalasz 1999; Owens et al. 2000), but all are surface finds with little potential for *in situ* deposits. The scarcity of Paleo Indian sites is a reflection not only of low population densities at that time, but also of local geomorphological processes that have tended to obscure or erode early Holocene deposits.

Archaic Stage The Archaic stage begins about 7800 B.P. in southeastern Colorado, and, as a whole, sites attributed to this stage are well represented. It is characterized by a shift to a wide subsistence spectrum of hunting and gathering, an increase in the use of ground stone tools in plant preparation, and, at its end at least, greater sedentism, which perhaps is a

precursor to a dependence on cultivated plants. It is divided into three periods: Early, Middle and Late.

Early Archaic period (7800-5000 BP) sites are relatively rare in southeastern Colorado (Eighmy 1984:68; Zier and Kalasz 1999:100). Indeed it is possible that during this period, which coincides with the Altithermal warming episode, the Plains were abandoned or minimally occupied by humans (Reeves 1973; Benedict and Olson 1978; Buchner 1979). Several Early to Middle Archaic points have been located on the PCMS (Lintz and Anderson 1989; Andrefsky 1990; Andresfky and Zier 1988; Owens et al. 2000). The Middle Archaic period (5000-3000 B.P.) is well represented by both radiocarbon and typologically dated components in southern Colorado (Eighmy 1984). Point types bear a resemblance to Southern Plains and Southwest types (including the Picosa Culture). A tested site on the PCMS (5LA5258) yielded an Early or Middle Archaic projectile point. Unfortunately this site did not produce any radiocarbon dates to confirm or reject this temporal association (Andrefsky et al. 1990). Other finding of Middle Archaic points include those from Welsh Canyon (Loendorf and Loendorf 1999) and the Black Hills (Owens et al. 2000). Archeological evidence for the Late Archaic period (3000-1850 BP) in southern Colorado is provided by a series of sites—including stratified rock shelters—such as Carrizo, McEndree Ranch, Medina, Recon John, and Trinchera. The last site provided not only stratigraphic sequences, but also organic material and bones that indicate an emphasis on small-game hunting (Wood-Simpson 1976:177). Archaic sites in southern Colorado are sufficiently numerous to allow the reconstruction of settlement systems: see, for example, Alexander and Babcock's (1982) study of the archeology of the FCMR, Lutz and Hunt's (1979) study of the Purgatoire and Apishapa highlands, and Eddy et al.'s (1982; 1984) study of the John Martin Reservoir. Late Archaic points although never common have been recovered from the PCMS during survey (Andrefsky et al. 1990; Loendorf and Loendorf 1999; Owens et al. 2000). There is a consistent pattern in increased numbers of projectile points through the Archaic on the PCMS, which assumably reflects population trends.

Late Prehistoric Stage The Late Prehistoric stage (Zier and Kalasz 1999) is used to represent the last two thousand years of aboriginal occupation of the study area. The major technological innovations are: ceramics, the bow and arrow, an increase in stone-built architecture, and the appearance of small quantities of cultivated plants, in particular maize. This stage corresponds to Eighmy's (1984) Ceramic period. Eighmy divided the Ceramic period into Early and Middle subperiods while Gunnerson (1987:97) and Zier et al. (1987:2-13) added a Late subperiod, which corresponds to Eighmy's Protohistoric period. Like Gunnerson (1987) and Eighmy (1984), Zier and Kalasz (1999) divide the stage into three periods but substitute the term Ceramic Period with Late Prehistoric Stage. The Developmental period dates from 1850 - 900 B.P., and corresponds essentially to Eighmy's Early Ceramic period (Zier and Kalasz 1999:160). The Diversification period (900 - 500 B.P.) is divided into the Apishapa and Sopris phases, which correspond to Eighmy's Middle Ceramic period (Zier and Kalasz 1999:189). The Protohistoric period is dated to 500 - 225 B.P. and correlates with the abandonment of Apishapa phase sites and the incursion of

Athabascan groups (Zier and Kalasz 1999:250).

The Developmental period dates between A.D. 100 - 1050 (1850 - 900 B.P.). After about A.D. 450, there appear to be differences between sites found along the Arkansas and Platte River systems, respectively. Sites along the Arkansas River system are assigned to the Graneros focus (Withers 1954), which is characterized by cord-marked pottery, corner-notched projectile points that are later replaced by side-notched forms, and slab-constructed circular dwellings. The Parker focus, which might be merely a geographical variant of the Graneros focus (Butler 1986:213), or vice-versa, is heaviest in the Denver Basin and South Platte River Valley region, and may extend to the San Luis Valley. According to Baugh (1994:269), the most recent (Developmental period) component at the Recon John Shelter may represent the most southerly and westerly extension of the traditional Plains Woodland complex, as exemplified by the Valley and Keith foci of the Central Plains.

The Diversification period dating between A.D. 1050-1450 (900 - 500 B.P.) of eastern Colorado contains variants of the Plains Village tradition, such as the Upper Republican complex, the Upper Purgatoire complex, the Apishapa phase, and the Upper Canark Regional variant. The Upper Republican complex (A.D. 1000-1450) is characterized as a sedentary culture based on hunting, gathering, and horticulture (Gunnerson 1987:68-71). It is located primarily in southern Nebraska and northern Kansas. The complex is associated with the prehistoric Pawnee by Strong (1935). The Upper Purgatoire complex (Dick 1963) is dated approximately A.D. 1000-1225 (Cassells 1997:223-224; Wood and Bair 1980:15), and is divided into three phases: Initial Sopris, Early Sopris, and Late Sopris (Cassells 1997:223-224). Subsistence during this time was a mixture of foraging and farming, and its architectural and ceramic styles reflect both Plains and Southwestern influences. It has recently been suggested that Sopris phase sites represent an archeological frontier of the northern Southwest (Mitchell 1996). Alternatively, Turner (1980) has suggested that Sopris phase populations may be Athabascan, based on a fairly high frequency (23%) of triple-rooted molars in a Sopris phase skeletal assemblage from the Trinidad Lake area.

The Late Prehistoric Stage, which dates between A.D. 100 - 1450 (1850 - 225 B.P.) is the heaviest period of occupation in the PCMS (based at least on site numbers). Artifact assemblages suggest continuity with the preceding Archaic (Andrefsky and Zier 1988:VIII-3) in terms of material culture and basic life styles. However, maize and squash, as well as Southwest pottery styles, suggest influence from formative-level cultures to the south (Gunnerson 1987: passim).

The Apishapa Phase of the Late Prehistoric Stage is a heavily represented cultural component on the PCMS. The Apishapa phase (or focus) was first recognized by Renaud (1931) and formally defined by Withers (1954). It may have antecedents in the Graneros focus (Baugh 1994:269). It is characterized by villages—of varying size—composed of upright slab-stone houses, often in defensible locations. The proximity of these sites to arable land (Campbell 1969:418-419) suggests some level of commitment to horticulture.

Ireland (1968) proposed that at the Snake Blakeslee site (Gunnerson 1989) occupants subsisted primarily on corn and bison. Campbell (1969), using supposed similarities between Apishapa sites and contemporary materials in the Texas and Oklahoma Panhandles, placed this phase into the Panhandle aspect. Lintz (1978, 1984, 1986) in a reworking of this material, proposed the Upper Canark variant (A.D. 1200-1500), which contains the Apishapa phase and the Antelope Creek phase of northeastern New Mexico and the Texas and Oklahoma Panhandles. Baugh (1994:282) has further added to the Upper Canark variant the Zimms complex of western Oklahoma and the eastern Texas Panhandle, and the Burial City complex of the northeastern part of the Texas Panhandle (see also Drass 1998:418, 422-425).

A review by Chomko et al. (1990: 14) sees significant differences between PCMS Apishapa sites and "classic" sites to the north. The latter are characterized by side-notched points and cord-marked ceramics, whereas Apishapa sites on the PCMS tend to have corner-notched varieties and a marked absence of ceramics. The PCMS sites that are located on canyon rims possess evidence of stone defensive alignments. They also tend to be earlier; dates cluster at A.D. 1000 compared to A.D. 1300 (clusterings which coincide roughly with the change from Prairie Side-Notched (in fact, a corner-notched variant) to Plains Side-Notched (a true side-notched), as defined by Kehoe (1966). It is, however, too early to desginate the PCMS Apishapa as a distinct phase or sub-phase.

The Protohistoric Period (A.D. 1450-1725) is characterized by ethnographically recognized tribes who were either hunters and gatherers, or part-time horticulturalists. Aboriginal inhabitants during this period had access to European goods, but were not in regular face-to-face contact with Europeans. A major Colorado Plains group was the Athabascans (specifically the Apache), who migrated south as part of the large Athabascan movement that began in Alaska sometime in the first millennium (Duke and Wilson 1994; Vickers 1994). They grew corn, beans, and squash, hunted extensively, and traded with Puebloan groups in northern New Mexico. These groups are represented archeologically by the Dismal River aspect (A.D. 1675-1725), which is found throughout large portions of the western Plains including eastern Colorado (Gunnerson 1987:102-107).

Archeological evidence suggests that the Apache entered southern Colorado sometime after A.D. 1300 (Campbell 1969:496). Excavations at a series of stone-circle sites associated with the Eastern Apache, located on the Carrizo Ranches on the Chaquaqua Plateau, were radiocarbon dated to the 14th century (Kingsbury and Gabel 1983). These sites also contained Pueblo IV pottery indicative of interaction with groups to the south. Other tribes of note during this period were the Comanche, the Arapaho, and the Cheyenne.

The Protohistoric Period on the PCMS is represented in occupations probably assignable to Apachean and Shoshonean groups (Andrefsky and Zier 1988: VIII-4), although the evidence is meager and subject to the severe theoretical and methodological problems of assigning ethnic affiliation to material assemblages (Duke 1991).

The Ethnohistory and History of the Pinon Canyon Maneuver Site

There are very few ethnohistorical data for the actual PCMS (Stoffle et al. 1984), and so inferences must be made from those of surrounding areas. From the initial period of European contact, which began in the middle of the 16th century, Plains Indians underwent profound cultural, social and economic changes, descriptions of which need not be replicated here. Initial contact was indirect, in the form of long-distance trade (beaver/muskrat pelts for numerous European goods), but was replaced by face-to face contact. In particular three items were significant. Beaver trapping (and later bison hide tanning) brought the Plains into the world economic system (cf. Lewis [1942] for an early and surgical analysis of the economic and social effects of this on Northern Plains groups, particularly the Blackfoot). Acquisition of the horse and gun allowed Indian groups to resist European expansion, but more often than not this was done by taking over the territories of Indian groups who were not so well-equipped. The horse itself also caused major economic and social changes, which are well documented by Roe (1955). In general, the period of European contact, then, can be seen as one in which Indian groups were forced to become much more mobile and to cope as best they could with the European economic nexus into which they had been unwillingly drawn.

Southern Plains groups made contact with Spanish groups beginning in 1541, when Coronado led an expedition across parts of New Mexico and Kansas (Hammond and Rey 1940). Coronado's description of the groups he met provide a good description of peoples who were still essentially "prehistoric." Coronado encountered two groups called "Querechos" and "Teyas", although there is dispute as to whether both were plains Athabaskans (Apaches) or Apache and Caddoan groups respectively (cf. Weber 1988: XVIII-5-6). Beginning in the late 17th century, the Apache, mounted and heavily armed, became a dominant force on the Southern Plains, raiding for both horses and slaves that were then traded to the Spanish (Weber 1988: XVII-7).

Despite the unstable relations between Apache and Pueblo groups it was, nevertheless, the former to whom the latter fled after a series of revolts (the biggest revolt started in 1680 and lasted for 12 years). In the early part of the 17th century, the Taos and Jemez Pueblos revolted against Spanish rule, and established a new settlement called El Cartelejo in western Kansas, which was under the control of the Apaches. It is unclear whether El Cartelejo was a specific pueblo or a region, however (cf. Forbes 1960; Schroeder 1974). By the 1660s the Spanish had moved the fleeing Puebloans back to their original settlements (Forbes 1960: 137-139), although the area continued to act as a refugium for Puebloan and Apache groups trying to escape Spanish domination. Weber (1988: XVII-9) points out that this fact sheds light on PCMS ethnohistory, in that (1) it establishes the Apache very near to the PCMS, if not actually in it; (2) it indicates the probability of social and/or economic ties between the Apache and Puebloan groups; (3) the PCMS would have been situated precisely between any of the movements between the two groups.

Beginning in the 18th century, however, the Apaches lost both power and territory as the Comanche expanded, as eastern groups like the Kansa, Oto, Iowa, Ponca and Omaha moved west, and as the area became a geopolitical arena contested by both France and Spain (Schlesier 1972).

Unfortunately, there are few specific references to the Apache in the PCMS, although the above data indicate that the Apache almost certainly claimed southeastern Colorado for at least part of the ethnohistoric period (Schroeder 1974). Specifically, Schroeder (1974) interpreted the 1706 route of Ulibarri's retrieval of Pueblo Indians from El Cuartelejo as passing east of present-day Trinidad, along the Emory Pass area and then down Chacuaco Creek to its junction with the Purgatoire River. There, Ulibarri found a group of Penxaye Apaches growing corn, beans and squash. Interestingly, Hyde (1976: 55) gives the creek's name as being derived from Chaguagua, the name of a Ute band. Ulibarri also reported that the Utes and Comanches were raiding the Apache between present-day Pueblo and Trinidad but had not yet succeeded in driving them out (Hyde 1976: 64).

A later Spanish expedition in 1719 led by Governor Valverde also found Apache groups occupying southeastern Colorado (Schroeder 1974). Valverde's professed objective was to prevent Ute and Comanche raids on the Apache, although the leisurely nature of the expedition indicates that he had no urgency in accomplishing this (Hyde 1976: 67-70); indeed, Valverde withdrew as soon as it became clear that he was going to make contact with the very Comanches he had been pursuing.

The Comanche, together with the Ute, succeeded in driving the Apache from southern Colorado and adjacent Kansas at the beginning of the 18th century (Weber 1988: XVII-13). With the exception of their defeat by de Anza in 1779 in the vicinity of modern-day Pueblo, the Comanche continued to expand their hegemony throughout the southern Colorado plains and areas to the south and east during the 18th century.

The Utes raided with the Comanche throughout most of the Colorado plains until the middle of the 18th century, when the Comanche turned on them. The Utes were originally mountain dwellers who made incursions into the Plains through numerous mountain passes (Hyde 1976: 54-57; papers in Nickens [1988]). The Ute Indians allied with numerous Indians during the 18th century, but principally with the Comanche until that alliance dissolved in the mid 18th century.

During the latter part of the 18th century, increasing Arapaho and Cheyenne incursions into the western Plains began to shunt the Comanche southward (Hyde 1976). Indeed, by the 1820's large camps of these groups were reported as far south as Pueblo County in southern Colorado (Weber 1988: XVII-18).

During the latter part of the 18th century and continuing into the first half of the 19th century, southern Colorado was contacted by comancheros and ciboleros (Hispanic and

Pueblo Indian traders and buffalo hunters) (Weber 1988: XVII-15). The comanchero trade was based on well-established prehistoric trade pattern between Pueblo farmers and Plains bison hunters (cf. Spielmann 1991). Initially involving native corn and bison products, by the beginning of the 18th century, the trade system incorporated Spanish goods, including horses and guns, as well as slaves. Trade fairs, such as the one at Taos, become an important component of the New Mexico economy (Carrillo 1988a: XVIII-8). This changed, however, under American rule, since the comancheros were now considered to be thieves and villains (Carrillo 1988a: XVIII-9).

Cibolero hunting comprised huge bison-hunting expeditions from New Mexico into the adjacent plains in order to take back bison products to their home settlements. These expeditions climaxed in the early 19th century. Bent's Fort constructed in 1833 just east of La Junta, Colorado also increased the numbers of Indian traders moving through the area. Increasingly, Anglo traders were attracted to southern Colorado and northern New Mexico to trade with both Indians and Hispanic settlements (Weber 1988: XVII-18-19).

Up to 1821, the ethnohistoric period of southeastern Colorado, as for adjacent areas, was characterized by processes that led to the demise of aboriginal groups as independent entities and increasing control over these areas by Spanish centered to the south. However, this area was never successfully colonized by the Spanish (Carrillo 1988a: XVIII-7), and it gained importance primarily for the resources that could be taken from it through trading and other activities.

Carrillo (1988a: XVIII-7) identifies comanchero trade, cibolero trade (mentioned earlier) and the sheep industry as the most important economic activities for this area during this time period. The first two have been briefly described earlier. The sheep-ranching industry climaxed in the final decades of Spanish rule with close to 500,000 sheep being driven south to Mexico every year (Carrillo 1988a: XVIII-13).

After 1821, what Carrillo (1988a: XVIII-1) calls the second period of historical culture change in the area was initiated. Mexican independence opened up trading opportunities between southern Colorado and Hispanic settlements to the south. For instance, pobladores settled the northern borderlands, appearing in southern Colorado by the 1850s (Carrillo 1988a: XVIII-22), and Carrillo (1988a: XVIII-14) sees similarities between descriptions of their settlements and some of the archeological remains of the PCMS. This second period lasted until the Mexican War of 1846-48 effectively ending Mexican domination of the area.

The 19th century saw increasing military pressure on Indian groups from the United States. In 1851, the U.S. government decided to allocate specific tribal territories to the individual groups (Weber 1988: XVII-19-20), and in 1867 the government signed a treaty with numerous southern Plains tribes, including the Comanche and Kiowa-Apache. This led ultimately to the Reservation Period and the removal of tribes from their homelands. The

Comanche, for example, were placed on a reservation in western Oklahoma (Wallace and Hoebel 1952). The American Period officially begins in 1849 (Carrillo 1988a: XVIII-14). The PCMS became part of the newly defined Territory of Colorado, enacted by Congress in 1861. Manifest Destiny and the spirit of western entrepreneurship swept the study area.

Of major concern was the need to open up southern Colorado to commerce, and for this freight (and later mail) companies were needed. Although the Santa Fe Trail, a spur of which passed close to the PCMS, had been open since the 1820s, stage stations for independent companies were established. In 1866, for example, the Hole-In-The-Rock station was opened near present-day Thatcher (Carrillo 1988a: XVIII-20).

Throughout the 1870s population increased as the mining and agricultural potential of Colorado were realized, and as a result, various railroads were constructed throughout southern Colorado (Carrillo 1988a: XVIII-21). The traditional comanchero and cibolero activities were closed down, and permanent settlements, both Hispanic and Anglo, began to appear. The former settlements tended to be more self-sufficient and communal than the individual family ranches of the Anglos that depended on local merchants for most of their supplies (Carrillo 1988a: XVIII-21). Ranching was still based on a mixture of sheep and cattle.

As the 19th century came to a close, Hispanic settlements were gradually bought out by Anglo ranching concerns (Carrillo 1988a: XVIII-21), with Texas cattle drives and the influx of large numbers of open-range cattle beginning the "industrialization" of ranching. In the PCMS area, the two largest cattle concerns were the Prairie Cattle Company and the Bloom Land and Cattle Company. In 1882, Sharps Ranch was established along Lockwood Arroyo (Carrillo 1988a: XVIII-33).

Large commercial interests, often bankrolled by British money, dominated the cattle ranching industry until 1909 when the Enlarged Homestead Act, together with improved agricultural technology and wheat varieties, encouraged small family farming homesteads to flourish in southern Colorado (Carrillo 1988a: XVIII-34-35). Until the middle 1920s, an improved climate, together with the construction of a fairly sophisticated irrigation system at Model, encouraged the local population to grow. Unfortunately, a drought that begin during the late 1920s ended most of these homesteads and the land reverted back to ranching again. A local helium industry and the construction of a booster station temporarily alleviated some of the pains of unemployment, but continued occupation of the PCMS and surrounding areas during the 1930s was made possible only by federal price support systems (Carrillo 1988a: XVIII-37).

From the end of the Second World War to the early 1980s, cattle ranching provided the economic mainstay of the area, but it was a tenuous existence at best. In 1983, the 12 ranches that now constitute the PCMS were bought by the U.S. Army, and the end of civilian control and use of the PCMS area effectively came to an end (Carrillo 1988a: XVIII-39).

CHAPTER 3
REVIEW OF PREVIOUS ARCHEOLOGICAL WORK IN THE PINON CANYON MANEUVER SITE

The history of archeological research on the PCMS is recent for a number of rather obvious reasons. Most importantly, as described elsewhere in this volume, archeological research on the Plains in general is, compared to many other areas on the continent, relatively recent. Also, most of eastern Colorado is privately owned and, therefore, not covered by the numerous federal laws pertaining to historic preservation. The PCMS, however, was transferred to the public domain in 1983, and intensive archeological investigations were initiated soon after.

According to Zier and Kalasz (1999), archeological investigations in southeastern Colorado can be subsumed under three categories: early investigations, Pre-1949; Academic Studies and Early CRM Archeology, 1949-1978; and CRM archeology, 1978-present. Little archeological emphasis was directed specifically toward the area within the PCMS until 1983, when the U.S. military acquired the property through public domain. The pre-1949 interest in southeastern Colorado mainly focused on architectural sites and rock art along the Apishapa, Purgatoire, and Arkansas drainages. Perhaps foremost among the early explorers was E. B. Renaud of Denver University. His research spanned 17 years and resulted in the documentation of more than 1000 sites, the great majority of which were in the Arkansas basin (Renaud 1931, 1932, 1933, 1937a, 1937b, 1942a, 1942b; Renaud and Chatin 1943). The era of Academic Studies and early CRM archeology before 1978 continued the interest initiated by Renaud and focused their attention on architectural sites and cave sites mainly attributed to the Late Prehistoric Period such as Snake Blakeslee (Chase 1949) and Trinchera Cave east of Trinidad. It does not appear that any of these early investigations were undertaken within what is now the PCMS.

It is in the last twenty years that considerable work has been conducted on the PCMS under the rubric of CRM obligations for the United States Department of Defence. Since 1983 archeological investigations in the PCMS have been carried out by both university and private consulting agencies: University of Denver (DU), University of Wisconsin-Parkside, Powers Elevation, University of North Dakota (UND), Western Cultural Resource Management (WCRM), Gilbert-Commonwealth, New Mexico State University (NMSU), Fort Lewis College (FLC), University of Colorado at Colorado Springs (UCCS), and others. In 1988, Larson-Tibesar Associates were contracted to synthesize existing historic and prehistoric data into a six-volume report, and this report still forms the single most important reference for research on the PCMS (Andrefsky 1990).

The University of Denver (DU) was contracted to conduct archeological surveys in 1983 and 1984, and their work has been reported in a number of volumes, each addressing aspects of the overall program of research (e.g. Kvamme et al. 1985; Peebles 1984; Pozorski and Pozorski 1984a, 1984b). In 1983, the Hogback and Canyon areas were surveyed, as well

as portions of the upland mesas and plains. Approximately 53,500 acres (21,4000 hectares) throughout the base were surveyed during the 1983 and 1984 field seasons and fifty sites were tested. The resultant data were used to generate a predictive model for high-probability site areas that were subsequently investigated (Kvamme 1984, 1992). The archeological data were then synthesized into a three volume manuscript edited by Christopher Lintz (1985).

In 1987, Larson-Tibesar Associates was contracted to reevaluate 68 of the DU sites and to complete their field documentation, as well as to record 23 archivally documented historic sites. Additionally, further sampling inventories were conducted. Larson-Tibesar produced a two volume synthesis of test excavations conducted on 50 sites in the PCMS in 1983 (Andrefsky 1990).

Of great interest is the quantity of rock-art in the PCMS (Cole 1984, 1985; Loendorf 1989, 1998; Loendorf and Kuehn 1991; Loendorf and Loendorf 1999; Zier 1988). Panels are both carved and painted, representational (human and animal) and abstract. Much of the rock-art is located close to the basaltic Hogback area, and is found not only on rock faces but also on individual boulders. The sites are difficult both to date and to assign to specific ethnic groups.

The geoarcheology and geomorphology of southeastern Colorado is now much better understood as a result of studies by Schuldenrein (1985) at the PCMS. Of particular value is the predictive geoarcheological model generated by this work. In a later study of the PCMS, McFaul and Reider (1990) reconstructed more than 13,000 years of alluvial and eolian history. They identified episodes of terrace and eolian deposition and two paleosols. They suggested the possibility that these depositional sequences held the potential to produce buried archeological deposits perhaps as far back as the Paleo Indian Stage.

Historical studies and syntheses have also been provided by Powers Elevation (Friedman 1985), Gilbert/Commonwealth Inc. (Haynes and Bastian 1987) and the University of Wisconsin at Parkside (Stoffle et al. 1984). Ethnohistoric information related to the PCMS was recently complied into a single volume (Jones et al. 1998), which includes both reservations, PCMS and FCMR.

Pinon Canyon Maneuver Site Literature Review

Some of the earliest archeological investigations that were conducted in what is now the PCMS were probably those of E. B. Renaud in his documentation of the archeology of Eastern Colorado (Renaud 1931, 1932, 1933, 1937a, 1937b, 1942a, 1942b; Renaud and Chatin 1943) although few of these sites are definitely attributed to sites within the PCMS boundary. Once the U.S. Army acquired the property in 1983, cultural resource projects have become the standard. These include inventory and evaluation (Andrefsky and Sanders 1987;Carillo et al. 1996; Guthrie et al. 1984; Haynes and Bastian 1987; Hunt 1999; Loendorf

and Loendorf 1999; NPS 1989; Owens et al. 2000, Owens and Loendorf 2002), geophysical surveys (Bevan 1992; DeVore 2002; Weymouth 1991) evaluative testing (Ahler et al. 2002; Andrefsky et al. 1990; Charles et al. 1996; DeVore 1993; Loendorf et al. 1996; Pozorski and Pozorski 1984; Shiavitti et al. 2001) data recovery (Carillo et al. 1993; Hardesty et al 1995; Hunt 1999) and rock-art documentation (Cole 1984; Kordecki and Loendorf 1988; Loendorf 1998; Loendorf and Kuehn 1991).

Evaluative testing of eight archeological sites on the PCMS was conducted by Fort Lewis College in 1994, and this was one of few projects involving test excavations on the PCMS up to this time. These eight sites, seven prehistoric and one historic, were dispersed across the base. Five of the eight sites, including the historic site, were recommended as meeting the requirements for significant resources under Criterion D of the NRHP (Charles et al. 1996). Testing and large-scale excavations by the Department of Anthropology at the UND on sixteen sites occurred from 1990 through 1991 (Loendorf et al. 1996). Of these sixteen sites, eleven were open site types, three were rockshelters, and two possessed remains of rock structures. One of the stone structural sites was likely the product of a historic site-use episode. The majority of these sites are along Burke Arroyo or in the nearby hills and arroyos. Additionally most of these sites date between 2500 and 1000 BP During the field seasons of 1995 and 1996, an archeological inventory was conducted in Welsh Canyon, a tributary of the Purgatoire River by NMSU. Archeologists found and recorded 234 sites dominated by rockshelter and cave sites in the upper reaches of the canyon and procurement sites in the lower regions (Loendorf and Loendorf 1999). In 1996, NMSU, again under a cooperative agreement with the NPS, conducted archeological research on the PCMS. This research consisted of subsurface testing and mapping of 11 sites in Welsh Canyon for the purpose of NRHP evaluation. Ten of the eleven sites date to the prehistoric period and eight of the eleven were recommended as potentially eligible for the NRHP (Schiavitti et al. 2001). In 1997, a large scale archeological inventory and reconnaissance was conducted by NMSU of the Black Hills region of the PCMS. Approximately 5663 acres were inventoried resulting in the discovery and recording of 325 sites, all but one of which possess a prehistoric or protohistoric component (Owens et al. 2000). A recent project at the Barnes Site, 5LA9187, was conducted by NMSU during the summer of 2001. This project was sparked by the discovery in 2000 of a broken Folsom point and other possible Paleo Indian artifacts. The field work consisted of surface reconnaissance, backhoe trenching, and test unit excavations. Extensive georacheological and geochronological analyses were conducted on the exposed profiles. Geophysical surveys completed the investigations at the site. These included electrical conductivity, gradiometer, and magnetic susceptibility surveys. The results of the investigations at the site demonstrated that all tested sediments date from 7600 BP or younger. Although a buried Paleo Indian component was not identified, a significant Late Prehistoric component was discovered which included a hearth, storage pits, and exotic artifacts (Ahler 2002).

Field work on the historic sites on the base has not been as extensive as that of the prehistoric sites. Until the current report, only eight of the clearly historic sites had been

tested. These include the historic site tested by Fort Lewis College in 1994 (Charles et al. 1996), those tested by Minette Church for her dissertation (2001) and two stage stations, Brown's Sheep Camp (Hunt 1999) and Lockwood Stage Station (Hardesty et al. 1995).

Despite the essentially management-oriented nature of the work in the PCMS, it is encouraging to note that the general public and individual researchers have been given access to the wealth of archeological data generated by these studies. Thus, portions of the Larson-Tibesar synthesis have been published as a memoir of the Colorado Historical Society, giving the public a much-needed synthesis of work in the PCMS (Lintz and Anderson 1989). Others have also initiated projects. For instance, Chomko, DeVore, and Loendorf (1990) offer a reappraisal of the Apishapa Phase of southeastern Colorado, based on PCMS data, while Kvamme (1992) reports on the results of a GIS-based, predictive site-location model for the High Plains which is based on the inventory data collected from the PCMS. Loendorf and Kuehn (1991) have presented a synthesis of rock art in the Pinon Canyon. Moreover, Loendorf (1991) published in the international journal *Antiquity* an innovative and important study of cation-ratio varnish dating of ten rock-art sites in the PCMS. Utilizing data acquired from the cultural resource inventory of the PCMS Andrefsky (1994) has recently published an article on lithic procurement in *American Antiquity*. Most recently Minette Church (2002) published an article in the *Journal of Social Archaeology* on homestead landscapes in southeastern Colorado with the primary database from her work at PCMS.

Finally, the findings of the archeological work at PCMS have also been presented to the public through television programs shown on Public TV. An overview of the PCMS's cultural resources has been shown on KRMA TV of Denver (Chomko et al. 1992), and a program on the PCMS's rock art has been broadcast by KTSC TV of Pueblo (Loendorf and Gange 1990). A third video in the Cultural Resources Series, *Souls of the Purgatoire*, written and directed by Hadley R. Harper and told by Keith Carradine addresses the history of the Pugatoire Valley from the perspective of the long-time residents of the PCMS and surrounding area (Harper 1996).

CHAPTER 4
RESEARCH DESIGN AND OBJECTIVES

The specific field and laboratory techniques used in this project are documented elsewhere in this report. These techniques were used to evaluate site 5LA3421 for potential nomination to the National Register of Historic Places (NRHP).

The federal legal criteria used in this evaluation are found in 36CFR60 and are as follows:

The quality of significance in American history, architecture, archeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
B. that are associated with the lives of persons significant in our past; or
C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
D. that have yielded or may be likely to yield information important in prehistory or history.

Sites may have national, state, or local significance.

The Colorado Plains Prehistoric Context (Eighmy 1984: 48-49, 64-65, 77-78, 103, 142-143,152-153) and the updated version (Zier and Kalasz 1999) provide criteria for each of the major cultural periods represented on the Colorado Plains that further assist in the evaluation of a site's significance and potential eligibility for nomination to the National Register. Larson-Tibesar Associates provide a specific context for evaluating sites that may contribute to a greater understanding of the prehistory and history of the PCMS (Andrefsky 1990).

The prehistoric research design established for the PCMS by Andresky and Zier (1988) is based on four traditional research approaches. The first is the question of evolution versus adaptation, as defined by Michlovic (1986). According to this model, prehistoric groups on the plains did not evolve in the sense that they made directional and immutable changes to their cultural systems. Rather, they made slight adaptive responses to environmental fluctuations. The underlying theme of this particular element is that change -

for example, the adoption to pottery - is so obviously beneficial that no "underlying causal mechanism" needs to be sought.

According to Michlovic (1986) and Andrefsy and Zier (1988), diffusion can be re-adopted as adequate explanation for some observed changes in the archeological record. However, the model still leaves unanswered the reason for the adoption of particular traits by societies who had, presumably, been successful in their lifestyle for centuries before those traits became available (cf. Duke 1991). As such, the model remains merely a statement of a truism - people change because they want to.

The second element is a reliance on general systems theory, which as used in archeology is essentially 1930s-style functionalism. This model tends to downplay the importance of internal causes of socio-cultural change in favor of external ones, in particular the environment.

The third element to the research design is the assumption of a close correlation between food shortages and archeologically visible changes in the sociocultural system, particularly settlement patterns and site sizes.

The final element is the assumption that hunter-gatherers will try to optimize their behavior in order to minimize effort and maximize resource procurement. The general location of sites in terms of access to specific sites is then refined to specific micro-locations (Duke 1978) through such factors as shelter, aspect and drainage (Jochim 1976; Duke 1978). The degree of sedentism at a particular site can be determined archeologically by such features as the complexity of architecture, the stability of the surrounding resource base, and its ability to be defended.

Utilizing these assumptions, Andrefsy and Zier (1988:VIII-9-13) provided a preliminary settlement model for the PCMS. Sensibly passing over the Paleo Indian stage, because of inadequate data, they propose that during the Archaic human populations either dispersed or congregated, depending on the seasonal availability and type resources, both food and non-food (large winter encampments along the main river valleys would be followed by smaller summer expeditions that went as far as the Rocky Mountains to the west.) This is similar to an earlier model proposed by Guthrie (1984) and based on Binford's (1980) collector-foraging model. Large residential base camps are located along the canyons, where evidence for manufacturing and maintenance activities, together with natural shelter suggests some degree of seasonal sedentism. Smaller field camps in the steppes and hills served as specialized resource procurement stations. Guthrie (1984) concluded that a complete seasonal round was supportable in the PCMS.

The changes during the Late Prehistoric Stage, in terms of greater sedentism and access to cultigens, caused an adaptive shift in seasonal movements, especially in terms of the switch to winter encampments in ecologically diverse canyons, rather than along the

major river valleys. Environmental degradation due to severe drought that occurred after A.D. 1000 produced an increase in contemporary sites along the east side of the Purgatoire River, perhaps in response to water availability. Increased aridity produced an abandonment of the PCMS by A.D. 1450, and after that period human utilization of the area was sporadic and short.

More specifically, the context report prepared by Larson-Tibesar Associates (Andrefsky 1990) for the PCMS takes the form of a set of five research domains that they believe will contribute substantially to this goal.

The first, chronology, is the most important. Projectile point styles are only partially adequate for constructing a chronology, for numerous reasons such as the long-time span of particular styles and their lack, so far, of association with radiometrically dated components. Ceramics are a phenomenon of approximately only the last two thousand years in this part of North America, and the heavy use of cord-marking as a decorative motif limits their use as more sensitive temporal indicators. As suggested by Andrefsky and Zier (1988:VIII-14), radiocarbon, archeomagnetic, and obsidian hydration techniques need to be used more often in the construction of a local chronology.

Domain 2, paleoenvironments, is crucial to understanding the processes of cultural change in the PCMS. As noted earlier, the regional models of Antevs (1955) and, later, of Wendland and Bryson (Wendland 1978; Wendland and Bryson 1974) are guides only. Local tests of the latter model (e.g. Wilson 1988) have shown the time-transgressive nature of their episodes. Schuldenrein et al. (1985:223-225), for example, has produced a reconstruction of the first millennium climate in the PCMS that is at odds with other scholars' interpretations.

The archeological record at PCMS particularly lends itself to detailed investigations of Domain 3, settlement and subsistence systems. Analyzing the patterns of archeological sites across a region such as PCMS contributes not only to the study of human-environment relations, but also to such phenomena as diffusion and trade.

Domain 4, exchange and mobility, is a corollary of the previous research domain. Unfortunately, as is evident in a recent synthesis of exchange systems in prehistoric North America (Baugh and Ericson 1994), the problems of distinguishing, in the archeological record, between the physical exchange of goods and the movement of people as explanations for exotic materials are considerable.

Domain 5, predictive modeling, addresses the use of univariate and multivariate statistical techniques to improve predictive capabilities for the PCMS. Patterns in site locations can be used to predict settlement and subsistence patterns elsewhere in the PCMS, and these are of use to both management and research objectives.

Friedman (1985:138-429) established five research domains for historic archeological studies in the PCMS: chronology; settlement; economies; demography; and culture. Carrillo (1990: XIX-1-4) integrated Friedman's work first with Hardesty's (1980) concept of the frontier, whereby zones of cultural transition are distinguishable from cultural zones on either side of it, and secondly with South's (1977) postulate that patterns in historical data will be correlatable with specific facets of human behavior, such as ethnicity. Carrillo (1990: XIX-3-4) also developed specific research objectives and test implications that would enable him to use strictly archeological data to supplement and augment historic documentary evidence (cf. Carrillo and Kalasz 1988; Kempton and Baber 1988; Kempton and Carrillo 1988; Carrillo 1988a, 1988b, 1988c, 1990 for detailed discussions of this work).

CHAPTER 5
SITE BACKGROUND AND METHODOLOGY

Site Description

Site 5LA3421 was recorded in 1984 by crew members from Denver University (DU) as part of a larger cultural resource inventory. The site was described as being located on the lowest terrace of Big Water Arroyo and extending on to the sandstone bedrock above the terrace. The site area as defined by DU was approximated at 40 acres. The primary features recorded included: 1) a partial stone circle and a stone enclosure; 2) four concentrations of burned rock; 3) eight bedrock metates; and 4) four rockshelters. Surface artifacts included ground stone, flakes, flaked-lithic tools (core, unifaces, bifaces, utilized flakes and projectile points) and cord-marked pottery. A tentative chronology for the site was provided based upon the presence of a Late Prehistoric projectile point, a broken Paleo Indian projectile point and the cord-marked sherd. Within the area of the rockshelters, dark, charcoal-enriched sediments resembled midden deposits and these alluded to the potential for buried *in situ* features and artifacts. According to DU archeologist Deb Angulski (1984), attributes of the site suggested that it may have been inhabited either permanently or at least seasonally. Support for this interpretation included the presence of architectural features, diversity of artifacts, the presence of bedrock metates and midden deposits. The prehistoric component was viewed as possessing high research potential. All tools were point plotted and collected. A collection strategy for the remainder of the artifacts included collecting 2 meter wide transects at 30 meter intervals running north to south across the site. Artifacts within and associated with the rockshelters were collected as a unit.

The remains of a historic wall and associated stone enclosure were discussed separately within the historic component portion of the site form. This component was recorded by R. Carrillo and E. Mead in 1984. The stone wall was noted on the site map but was not further documented in the site form supplied to FLC. The stone enclosure was described as the remnants of a foundation of probable juniper poles and brush construction. It was interpreted to be the ruins of a semi-circular structure that was as either a shelter or an animal enclosure. No associated Euro-American artifacts were recorded (Carillo and Mead 1984).

I The 1984 site form did not mention a historic homestead across Big Water Arroyo to the west. The site map did not continue across the drainage to the west and north. A site file search on the Colorado Historical Society website revealed a previously recorded site, 5LA3121, in the same location as the historic homestead. The site form was requested from DECAM at FCMR, and a perusal of the site form confirmed the impression that the historic homestead was a separate site. At the time that FLC conducted the work at this site both historic homestead and prehistoric components were referred to as one site under site number 5LA3421; furthermore, it had been remapped in 2000 with both components combined under one site map (Kuehn 2002). It is uncertain when the historic homestead and the prehistoric

component became collectively known as 5LA3421. Since it had been previously tested as 5LA3421 and all references had been made to this single site number following the 2000 testing, it was decided to continue using a single site number for the 2002 site evaluation.

Field Methods and Techniques

Unless stated otherwise, field methods rigorously followed those prescribed in the *Guidelines to Required Procedures for Archeological Field and Laboratory Work at Pinon Canyon Maneuver Site, Las Animas County, Colorado* (Dean 1992), and the reader is referred to this document for procedural detail. As previously discussed in Chapter 1, the site was divided into four areas— Area A - D. In a few instances minor changes to the field methods were implemented to adjust to particular circumstances of the different areas of the site. These modification are outlined in the individual chapters that follow.

Upon arrival at the site, a general surface reconnaissance was conducted. This allowed for crew orientation and the location of the site datum. Due to the size of the site and the presence of multiple cultural components, the site was divided into four separate areas. The boundaries of these areas were defined partially by the existing military fence used to protect the site, by major topographical features (i.e. drainages and rock outcrops), and by the general extent of surface artifacts associated with a particular cultural component. These areas were given separate letter designations (A, B, C and D) in the order of our investigations.

<u>Surface Investigation</u>

Each Area was inventoried for surface artifacts prior to conducting subsurface testing. This was done in order to define artifact concentrations, temporal component boundaries and to locate any diagnostic artifacts or tools. Systematic transects were conducted across each Area at 5 meter intervals. All prehistoric and historic artifacts and features were pin-flagged. These include modified and unmodified chipped stone, groundstone, prehistoric and historic ceramics, metal, glass, buttons, cans, non-portable groundstone and exposed faunal remains. Flaked tools and diagnostic artifacts were mapped and collected for analysis in the laboratory. Non-tool debitage and non-portable ground stone artifacts were recorded in the field.

Mapping A Topcon Total Station, positioned over the site datum from the 2000 field season, was used to map the site. The position of the datum was arbitrarily set at 1000 m north, 1000 m east. The elevation of the datum was set as 100 m. However, due to a lack of information available to us at this time, we set in our grid points and subdatums to true north, when in fact, the previous crew had used magnetic north. Due to the overall size of the site, several subdatums were also set in for ease of mapping and higher accuracy of information. At least one subdatum was established for each Area. Subdatum locations were referenced horizontally and vertically to the main site datum.

Mapping was consistent across the entire site. All prehistoric and historic artifacts and features identified during the site inventory were mapped. Additional mapping points included topographical boundaries (i.e., drainages, etc.), military fence boundaries, disturbances from mechanized vehicles, test units from previous archeological investigations and the location of the 2002 FLC archeological investigations (i.e., geophysical survey grids, test units, auger and shovel tests). The units from the 2000 excavation were often marked by stakes and sometimes slight depressions. Whenever possible, we mapped these previous excavation units. Detailed feature maps were drawn by hand, as were test unit plan view and profile maps. A Trimble Geo Explorer III global positioning system (GPS) was used to locate the main site datum and subdatums.

The Total Station data was downloaded regularly in the field using TDS Survey Link. The data was then brought into ArcView to produce a field map used for reference. Once in the lab the field data was downloaded into AutoCAD 2002, a drafting program from Autodesk, Inc. Contours for the site map were created from Total Station information that was brought into Surfer 7, a contouring and surface mapping software program from Golden Software, Inc. The geographic data collected from the Trimble GPS unit in the field were downloaded into the Pathfinder Office Software. The UTM (Universal Transverse Mercator) data points were differentially corrected in Pathfinder Office and the georeferenced information was loaded into AutoCAD and later into ArcView. The locational map was produced in ArcView, a mapping program from ESRI. While the site maps were created in AutoCAD, profile maps were created in CorelDRAW 7 and were referenced to the main site datum.

Geophysical Surveys

Geophysical surveys were conducted in two areas of the site, Area A and Area D. FLC owns and operates two instruments, a gradiometer and a resistance meter. Both magnetic and resistance surveys were conducted at the site. These surveys are almost identical to others conducted by Steven DeVore of MWAC at the Barnes Site, also on the PCMS (DeVore 2002). At 5LA3421, gradiometer surveys were carried out at Areas A and D, while the resistance survey was restricted to Area A. A system of 20 x 20 m grids was superimposed over the areas chosen for investigation. The grid corners were mapped with the Total Station. The grid was aligned with true north and wooden grid stakes were placed at each corner. Magnetic susceptibility samples were collected from two profiles and these samples were processed and analyzed by Kelsy Lowe and Steven De Vore.

The survey was completed efficiently by using a set of three ropes marked at one-meter intervals. Two of the ropes were placed parallel to each other along the north and south grid boundaries. These ropes served to guide the traverse interval. The other rope was used perpendicular to these and served to guide the sample interval.

The zig-zag method was used exclusively during the survey. Using this methodology, samples were collected from south to north to the end of each grid. The

operator then moved to the east one meter and continued taking points down the line from north to south. We began the survey of each grid from the southwest corner and continued in a clockwise direction through to the southeast corner. If a point could not be taken because of rocks or vegetation, a dummy log was assigned to this point. A dummy log essentially means that no value was applied to that point in the field.

Data were recorded by the instrument and in the case of the resistance meter the data was recorded by hand on a field recording sheet as well as being recorded in the internal memory. General information about the site, grid and instrument set-up, was recorded on field geophysical survey forms. Specific comments about the readings and surface features were recorded directly on the data sheet. Finally, a digital photograph of each grid unit was taken for later reference. At the end of each day, the data were downloaded into a laptop computer and into Geoplot software.

Gradiometer Magnetometers and gradiometers surveys work on the principle that buried artifacts, features or changes in the soil produces minute changes in the earth's magnetic field. The earth's magnetism is caused by an east-west flowing current regime at the core-mantle boundary deep within the earth's core. The interactions between the hot, liquid metal outer core as it rotates and convection within the inner core create circular currents. The currents create the magnetic field. The magnetic field has a distinctive dip from the poles to the equator (Clark 2003). Soils or obstacles beneath the earth's surface (or on the surface) can locally modify the earth's magnetic field. Magnetometers and gradiometers measure either the total strength of the magnetic field in the case of proton magnetometers or they measure the component of the field along the axis of the sensor as is the case with gradiometers (Mussett and Khan 2000). In either example, they are all measuring the same thing–the strength or amplitude of the earth's magnetic field (Bevan 1998). Magnetic surveys are nonintrusive and are therefore passive geophysical techniques.

In a magnetic survey, the instruments measure the warping or distortion of the earth's magnetic field caused by ferrous materials (iron) and by oxides of magnetite, haematite and maghaematite (Clark 2003). On archeological sites the oxides are usually the most significant compounds and are often subtle and can only be detected with sensitive magnetometers. These magnetic anomalies can retain a permanent or remnant magnetization when placed in a magnetic field or they can acquire a temporary magnetization that is lost when the field is removed. Thermoremanence is permanent magnetization and can be caused by firing beyond the Curie point, which effectively demagnetizes the oxides. Upon cooling the oxides are re-magnetized by the earth's field and align with the geomagnetic field at the time of the firing. This concept is inherent in thermoluminesence dating. In the case of pottery kilns, hearths and roasting pits, the magnetism is relatively strong and can be easily detected. More subtle feature such as unfired pits, houses fills, ditches and roads can also be detected with the magnetometer because topsoil is normally more magnetic than underlying subsoil or bedrock and when features are filled, either intentionally or unintentionally with topsoil, they will produce a positive magnetic signal. Less magnetic material intruding into the topsoil, such

as many kinds of masonry, can be detected by a subtractive effect, which give a negative magnetic reading (Clark 2003). Highly magnetic (ferrous) items can produce dipole reading (high and low).

Magnetic field strength is measured in nanoteslas (nT; 10^{-9} Tesla). The earth's magnetic field strength ranges from about 40,000 to 50,000 nT (Weymouth, 1986:341). On the other hand, magnetic anomalies of potential archeological interest can, on-the-average, lie within ±5 nT, and soil unit differences can be as subtle as 0.1nT or less (Kvamme 2001).

The gradiometer used on the survey was a Geoscan Research FM36 fluxgate gradiometer. Samples were collected 8 per meter (.125 m) with a 1 meter traverse width. As mentioned above, the survey was accomplished using the zig-zag method. This instrument measures the strength of the magnetic field in a particular direction and therefore must be aligned and balanced in this direction. A zero reference datum was established off the grid to the east. Instrument alignment and balancing took place at the beginning of the day and after lunch to correct for, among other things, fluctuating temperatures.

A portable laptop computer on the site allowed us to download data throughout the day. Data was collected by one person, therefore reducing human error. The intense heat at the site in July caused problems with the readings. Some of these heat-induced fluctuations could be corrected during post-processing, but many remain noticeable as noise in the data.

Electrical Resistance Electrical resistance surveys work on the principle that anomalies beneath the ground can be detected by differences in their resistance to the flow of an electrical current. These surveys measure the distortion of an induced electrical field caused by something in the subsurface, in our case it is the archeology or cultural feature (Clark 1990). Because an electrical current is injected into the ground to generate an electrical field, this type of survey is an active remote sensing technique.

To cause a charge to flow, a voltage must be applied. Voltage is also referred to as potential difference (a measure of the energy used to move the charge). As the voltage is applied and the current flows, a resistance is encountered to the movement of the charge. The resistance is dependent on the physical characteristics of the medium in which the charge flows. The basic measure of the resistivity is the Ohm-meter or Ohm centimeter.

The resistance to the flow of electrical current in sediments and soils depends on several variables. The most important variables are soil moisture and soluble salts (mobile ions), but the most important is the soil moisture content. Other significant variables to resistance include soil permeability and temperature. For more detail on the properties that influence soil/sediment resistivity, the reader is referred to Weymouth and Huggins (1985:222). Seldom is there a one-to-one correspondence between an individual variable and the resultant resistance data. On the contrary, these variables show wide spatial variation depending on environmental conditions. Therefore, the resistivity of different archeological

sites changes accordingly. Since no two archeological sites possess the same subsurface properties, the resistivity data from different archeological sites will vary as well. It is entirely possible that a feature that is easily found by resistivity survey in one location may be imperceptible in another (Weymouth and Huggins 1985:224). If the sediments are completely uniform, there will be no contrast in the electrical data, and the resulting map will be featureless. However, when the archeological feature (or geological feature) differs from the sediments in various properties then the induced electrical field is no longer uniform. The resistance either increases or decreases. The differences in the electrical properties or contrast combined with the size and depth of archeological features produces a record that can be mapped (Somers 1998:83).

The resistance survey was conducted with a Geoscan Research RM15 Resistance Meter. The Twin-probe array (PA1 or PA5) configuration was used throughout the survey. In this array, two mobile probes (C_1, P_1) are fixed to the instrument frame and two remote probes (C_2, P_2) are placed at a distance from the area to be surveyed. A .5 m distance between probes was selected for the mobile probes. A probe distance of .5 m was anticipated to detect features at depths between .25 m and 1.5 m below the surface. Samples were collected two per square meter. This was accomplished using a .5 m sample interval and a 1 m traverse interval. It is believed that this sampling density would be sufficient to detect most buried features at the site.

The remote probes were always placed at a distance of ≥ 15 m from the grids that were being surveyed. Fifteen meters is required because the spacing between the remote probes and the mobile probes has to be 30 times that of the probe distance (.5 m) to keep the change in apparent resistance under 3% (imperceptible variation) across the grid. The process of moving the remote probes so that they always remained 15 m or more from the grids while keeping in a linear pattern took careful planning from the outset. In some instances several resistivity datums had to be established to complete the survey.

Each time the remote probes were moved they had to be referenced to their previous location to insure that the edges between the grids would remain seamless on the map. This required that the instrument be moved to a new location near or within the next set of grids to be surveyed. While the remote probes were still in place, a value reading in Ohms was taken at the new location. The remote probes were then moved to a new resistivity datum location and the Ohm value obtained from the instrument was matched to the Ohm reading at the new datum location. This was accomplished by moving the remote probes apart or together until the Ohm value was the same between the old datum and the new resistivity datum. The Ohm reading then became the value of the datum. The spacing between the remote probes is not critical and can be adjusted to between .25 m and 2 m if necessary.

The memory in the Geoscan Research RM15 resistance meter is such that it could hold an entire days worth of data; therefore, it was not necessary to download during the day. Each night the data were downloaded to a laptop computer. Unlike the gradiometer, the heat

was not a problem for the resistance meter; however, the dry sediments may have influenced the resistance reading slightly because of the inverse relationship between resistivity and conductivity.

Magnetic Susceptibility Magnetic susceptibility measures the degree to which a substance can be magnetized (Scheriff 1973). It is defined as the ratio of the induced magnetic field to the applied magnetic field and is expressed as volume susceptibility (Appendix I). Magnetic susceptibility is important to archeologists for two primary reasons. Topsoils (and therefore buried A horizons) typically possess greater magnetic susceptibility. Second, human activities associated with site occupation also display enhanced susceptibility of the topsoil (Clark 1996). Therefore sediment samples that display increased magnetic susceptibility values could be interpreted as A horizons or paleosols, as buried ethnostratigrahic units or both.

Samples were collected from two areas of the site for magnetic susceptibility analysis. The samples were collected from the cutbank profile south of Big Water Arroyo and from Test Unit 3 in Area D. The samples were collected every 2 centimeters apart for the full vertical length of each profile. The sediments were collected with a clean dry trowel and placed in airtight plastic baggies. These were labeled as to Field Specimen (FS), vertical and horizontal provenience, excavators initials and date. The results of the magnetic susceptibility are presented in their entirely in Appendix I.

Gradiometer and Resistance Data Processing The magnetic and resistance data were recorded in the instruments memory and downloaded daily into Geoscan Research's GEOPLOT software program. In this program the data are separated into the individual grids. Because the magnetic data is stored as a string of values, the operator must identify the survey parameters in the software so as to let the software know where to stop one grid's points and start another. Individual grids were combined to form a master grid and then a composite grid was created from the master grid. Shade plots and relief plots were made from the data from both surveys. The data were subjected to a series of post-processing functions intended to remove unnecessary noise, smooth the data, and bring out more subtle features. The post-processing was contracted to Dr. Lew Somers of Geoscan Research. After the data were post-processed, they were exported as ASCII files and imported into Surfer 7, a mapping software program. From here image and contour maps were generated.

Subsurface Testing

Auger Test Probes (ATP) Auger testing was conducted to establish the nature of the subsurface deposits in Area A and Area D. The purpose of the auger tests were twofold. In Area A, auger tests were used to collect preliminary data on the nature of the subsurface deposits so that we had a working knowledge of the substrata before we began the geophysical surveys. A second purpose for augering was to determine the absolute depth of the soil/sediment deposits in Area D after discontinuing test units excavations when culturally sterile deposits were encountered. Auger size was a 3" bucket.

Shovel Test Probes (STP) Shovel testing was conducted within Area D only to sample the depth and nature of underlying sediments and to help determine the horizontal extent of artifact distribution. Shovel testing was conducted under the guidelines specified in the PCMS field and laboratory manual (Dean 1992). STP's were placed four meters apart along straight lines. The average diameter of the STP's was 35 cm. Each STP was excavated to culturally sterile substrata and terminated at an average depth of 70 cm (Appendix VII). The sediments were screened through $^1/_8$ inch wire mesh and all artifacts were collected. STP data, which includes diameter, depth, materials recovered and stratigraphic description, were recorded. Upon completion of archeological testing at the site, all STP's were backfilled.

Test Units In general, test unit excavations followed the guidelines set forth by Dean (1992). Modification of these guidelines occurred as field conditions dictated. Excavation units were selectively placed within each Area, except for Area C where a random sample of units was excavated. Test unit placement took into account information from various sources including shovel and auger test results, surface artifact distribution, feature investigations, surface stability, geophysical survey results and the potential for significant sediment accumulation. In cases of visible surface features, a test unit was often placed within or adjacent to the feature to determine feature function and the possible association with a use surface. As a rule, test units were 1 m x 1 m in size; however, on occasion test unit size varied to accommodate testing within features or when a larger area was desired such as when testing for geophyscial anomalies.

Test units were primarily excavated using picks, trenching tools, shovels and hand trowels. In some cases, when a higher degree of control was needed, ice picks and brushes were used. Sediments from all units were screened through ¼ inch wire mesh. Artifacts collected from each level were assigned unique Field Specimen (FS) numbers. Material classes were bagged separately within an FS number. Artifacts found *in situ* were mapped in place and assigned an additional point provenience designator. A 33- x-33 cm control sample ($^1/_9$ of a 1 m x 1 m unit) from each level or layer was retained for processing in the field laboratory, either through water-screening or flotation. In the case of contiguous test units measuring 2 m -x- 2 m, similar sized control samples were retained from all four corners, preserving the ratio of $^1/_9$ of the test unit retained for processing. In addition to the control samples, flotation, soil, pollen and radiocarbon samples were collected as appropriate. Feature excavations were also conducted in more discreet areas defined by the individual feature boundaries. Sediments from feature excavations were screened through ¼ to $^1/_8$ inch wire mesh or saved as flotation samples to be processed in the field laboratory. Wall profile drawings were completed for at least two walls in each test unit. Plan view maps were completed where appropriate.

In Areas A and C test units were designated by the northing and easting of the northwest corner. In Area D, test units were assigned numbers from 1 to 9. In each Area vertical control consisted of excavating in arbitrary 10 cm levels and within identified stratigraphic layers (natural or cultural). In a few instances, excavations were conducted in

5 cm levels for better vertical control and on rare occasions levels were expanded to 20 cm when less control was desired. Units were excavated parallel to the ground surface, and this was a general rule followed throughout the project. The test units were set to true north (11° easterly declination). In all Areas the four corners of each test unit were mapped with the Total Station.

Individual test unit excavations were terminated with the identification of culturally sterile strata. Feature excavations were terminated when sufficient data had been collected to determine its nature and its function. Excavations were discontinued when sufficient data were collected to determine the site's eligibility or ineligibility for recommendation to the NRHP. Recovered artifacts and samples from the surface and subsurface were transported to the Department of Anthropology at FLC for additional laboratory analysis and cataloging. The test units were backfilled and the sod layer replaced at the end of archeological testing.

Field Recording Data from field work was recorded on the appropriate PCMS/FCMR forms. Ancillary FLC forms were used for field specimen inventories, stratigraphic descriptions and photographic descriptions. Black-and-white photographs were taken throughout the testing as were digital photographs and color slides. Photographs were taken of at least two profile walls from each unit. Site overview photographs were taken as well.

Stratigraphic descriptions of all profiles and features included information on pedogenic structure, Munsell color, soil texture, inclusions, reaction to hydrochloric acid, evidence of burning, soil horizon designation, percentage of gravels, stratum thickness, and evidence of cultural features or artifacts. Several terms were used throughout the field recording to delineate the stratigraphic units. The nomenclature adopted in the field was carried over into the report descriptions. These terms are defined below.

Layer A stratigraphic unit, usually horizontal; consisting of similar sediments sometimes containing evidence of human occupation. Layers were determined while excavating and, therefore, do not always cohere with the strata defined in profile after the unit was completed.

Level Arbitrary unit of excavation, usually 10 cm.

Stratum A stratum is a distinctive body of sediments or bedrock that is differentiated from overlying, underlying or adjacent strata on the basis of physical appearance. A stratum is usually horizontal and often defined in profile. Often but not always, it consists of sediments lacking evidence of human occupation. Strata are numbered sequentially from top to bottom and are usually consistent across each Area. They can vary in thickness and geographic extent but must be mappable or traceable for long distances, usually beyond the boundaries of the site.

Ethnostratigraphic Unit A unit of cultural material whose artifacts must be only those

artifacts whose age of manufacture or use is contemporaneous with the age of deposition of the stratum. In other words, the cultural material must be in situ and dated to the same time period as the sedimentary deposit.

Soil Horizon A layer of soil material approximately parallel to the land surface, that has been altered in place from pre-existing sediment by physical, chemical, and biological processes occurring near the surface. A soil horizon differs ins some observable characteristics fro adjacent soil materials.

Test unit descriptions typically include a discussion of the stratigraphic layers identified during excavation and the corresponding strata designations defined in profile. This division in discussion was retained to preserve the specific data recorded for each. Correlations among layers, strata, and soil horizons were made whenever possible.

<u>Field Artifact Analysis</u>

Field artifact analysis was conducted on non-tool flaked debitage and non-portable groundstone. The procedures for the field analysis are described below.

Flaked-Lithic Debitage Unless collected flaked-lithic analysis of debitage was conducted in the field. Field analysis of the flaked-lithic debitage follows the standards set forth by Owens et al. (2000: 17-22) and is based on Ahler's (1989) approach to mass analysis of flaking debris. This approach emphasizes size-grade distributions of raw material types. It is based on the assumption that larger flakes dominate during earlier stage lithic reduction strategies, while later stages produce greater numbers of smaller flakes.

Recorded flake attributes include flake type, presence or absence of cortex, size and raw material type. Four categories of flaking debris (flake type) were recognized: shatter; simple flake; complex flake and bifacial thinning flake. These flake types are defined below and follow the definitions of Ahler (1989).

Shatter is an angular piece of flaked and flakeable stone that lacks any feature which will allow determination of dorsal or ventral surfaces or any determination of direction of force reduction. A simple flake is a freehand percussion or pressure flake that exhibits parts of no more than two previous flake scar facets on the dorsal surface (exclusive of small platform trimming/shaping flakes). A simple flake may or may not retain the platform.

A complex flake is a freehand percussion or pressure flake that lacks the specialized features of a bifacial thinning flake but retains all or parts of three or more previous scar facets on the dorsal surface (exclusive of small platform trimming/shaping flakes). Complex flakes may or may not retain the platform. A bifacial thinning flake is a technologically specialized flake removed from a biface during mid-to-late stages of thinning. Bifacial thinning flakes retain a combination of most of the following attributes: a platform, which

is a fragment of a bifacial margin (linear and faceted); lipped platform; flat, very thin cross-section (transverse and longitudinal); feathered, low-angle lateral margins and termination; slight curvature in longitudinal section; multiple dorsal scars; dorsal scars, which converge from different directions; and little or no cortex.

Flakes were size graded with the aid of three, small-hand screens (½" and ¼"). Flakes greater than 1" were classified as Grade 1, flakes greater than ½" and less than 1" were classified as Grade 2, and flakes smaller than ½" were classified as Grade 3.

Material type descriptions are based on those classified by Andrefsky (1988) and redefined by Ahler (1996). Material types identified in our sample include: basalt/hornfels, chalcedony, chert, argillite, limestone, obsidian, orthoquartzite, quartzite, silicified wood and siltstone. All of these material types, except for the obsidian, have been reported as occurring locally on the PCMS (Ahler 1996: 339-355).

Ground stone Ground stone artifacts were categorized as portable or non-portable. Portable ground stone, such as manos, were collected for laboratory analysis. Non-portable ground stone artifacts were recorded on appropriate PCMS/FCMR forms and left in the field. The field analysis was designed to emphasize morphological variability, anticipating that such variability will reflect changing temporal trends in ground stone utilization. It establishes condition (completeness), type (raw material type and morphology), form of the ground surface, shaping (preparation or modification) and size (maximum length, width, thickness), and describes characteristics of each grinding surface. This includes the surface size, shape, presence and direction of striations, and the presence of polish, pitting/pecking, and smoothing. The bedrock metates were previously recorded by DU in 1984 (Angulski 1984), and therefore not recorded during the 2002 FLC field season.

Laboratory Methods and Techniques

During the 2002 field season, temporary field laboratory facilities were located at Red Rock Canyon Ranch, PCMS (July through August). All subsequent laboratory work was conducted at the facilities of the Department of Anthropology, FLC. Laboratory methods follow the required procedures established by Dean (1992) for work conducted at PCMS and modifications to Dean (1992) as set forth by Cowen (Pamela Cowen personal communication 2003). Adherence to these guidelines insure that data collection is compatible with previous archeological research conducted at PCMS. All recovered artifacts/materials were inventoried and recorded on appropriate PCMS/FCMR Transaction Logs. The artifacts were cleaned according to conservation procedures, then rebagged and labeled as outlined in Dean (1992) and by Cowen (Pamela Cowen, personal communication 2003). Personnel from FLC analyzed the flaked-lithic artifacts, ground stone, nonhuman faunal remains and historic artifacts. Additional laboratory analysis procedures are discussed below.

Samples

The control samples collected from each excavation level were either wet screened or processed through a flotation device in the field laboratory or at the laboratory facilities at FLC. These control samples were used to recover smaller cultural material normally lost during dry screening with $^1/_4$ inch mesh. The wet screened samples were processed through $^1/_{16}$ inch mesh, air dried and sorted. The flotation samples were processed with a Sandy flotation device. Both light and heavy fraction materials were sorted. Macrobotanical, gastropod and charcoal samples were collected from both methods of processing. Selected samples were submitted along with light fraction samples to High Plains Macrobotanical Services for identification and analysis. The results of this analysis are presented in Appendix II. Charcoal collected in the field and from the control samples for radiocarbon dating were submitted to Beta Analytic Inc. for dating (Appendix III). Soil samples were collected for further textural division and selected samples were sent to Colorado Analytical Laboratories, Inc. for analysis (Appendix IV). Pollen samples were collected for paleoenvironmental data and selected samples were sent to the Palynology Laboratory at Texas A&M University (Appendix V). Sample collection from the profiles for magnetic susceptibility analysis was provided earlier in this chapter.

Flaked-Lithic Artifacts

For coding purposes, flaked-lithic artifacts were divided into the following categories: biface, flake tool, core, complete flake and broken debitage. Recorded attributes are prescribed by Dean (1992). Additional analysis and raw material type classification utilized a system developed by Dr. Ahler for the PCMS Black Hills Survey (Owens et al. 2000). This system categorizes the lithic tools according to techno-morphological classes. The classes identified in the present artifact assemblage have been adapted from Owens et al. (2000: 20-21).

Patterned Flake Tools

Biface A biface is a patterned tool with generally shallow-angle retouch on both faces. Both complete and biface fragments were weighed and measured whenever possible. Techno-morphological classes of bifaces are as follows:

Small, thin-patterned bifaces are bifaces that have been heavily shaped by intentional secondary flaking (patterned), are small and thin in size and form (e.g., arrow point) and exhibit only pressure flaking. This class includes both technologically finished and unfinished forms.

Large, thin-patterned bifaces are defined as bifaces heavily shaped by intentional secondary flaking (patterned), medium to large in size and form (e.g., dart point) and shaped by pressure flaking and/or percussion techniques with highly regularized bifacial margins. This class includes both technologically finished and unfinished forms.

Other large-patterned bifaces include large, thin bifaces that lack hafting elements and

may have been used as handheld cutting implements. This class includes both technologically finished and unfinished forms.

Projectile Point Projectile points compose a portion of the biface assemblage and are distinguished by the presence of a haft element. Descriptive terms for morphological attributes of projectile points were adapted from Lintz and Anderson (1989). Measurements for neck width, neck length, neck height, haft length and base width were made whenever possible. The collected projectile points were compared to Lintz and Anderson (1989), Loendorf et al. (1996), Loendorf and Loendorf (1999), Owens et al. (2000), Schiavitti et al. (2001) and Owens and Loendorf (2002). As needed for specific information, the following sources were also consulted: Gunnerson (1989) and Perino (1971).

Diagnostic attributes, including overall size and hafting morphology (stemmed or flanged, base shape, tang and shoulder characteristics), provided a means to visually compare projectile point types and determine similarities with published types. As with all nonstatistical projectile point comparisons, the results are somewhat subjective. Based on morphological similarities with projectile points from dated contexts, relative dates were assigned to the points whenever possible. All projectile points were examined to establish a base-line date or to add to an existing one. Other data were used to assess site dates, such as the presence of ceramics, structures and perhaps more importantly radiometric dating.

Flake Tool Flake tools exhibit both patterned and/or unpatterned modifications in the form of intentional retouch and/or utilization damage. Techno-morphological classes of flake tools include patterned and unpatterned. A patterned flake tool is defined as a flake tool with secondary flakes removed to produce a form or outline intended by the knapper (e.g., end scraper). An unpatterned flake tool is defined as a flake tool with one or more edges macroscopically modified by intentional retouch and/or utilization damage. The outline of these tools is largely a product of the flake blank shape rather than intentional retouch. Both complete and fragments of flake tools were weighed. The amount of cortex present was identified along with degree of retouch and utilization observed.

Core Non-bipolar cores consist of any core or core-like tool produced by freehand (non-bipolar) percussion flaking. These artifacts sometimes exhibit intensive battering along the ridges between flake scars. Cores and core tools were weighed and the amount of cortex present was noted. The number of striking platforms and flake scars were identified, along with the presence of use wear.

Flaked-Lithic Debitage

Non-tool flaked-lithic debitage recovered from the site was initially separated by raw material type into categories of complete and broken debitage. These artifacts were also classified by the debitage systems previously described in this chapter.

Ground Stone

Data was recovered from both portable and non-portable ground stone. Recorded attributes from both are prescribed by Dean (1992). The non-portable ground stone were analyzed in the field. The portable ground stone collected in the field were analyzed in the lab. Analysis is similar to that described for the non-portable ground stone but also includes the identification of edge grinding. Some of the recorded attributes are only applicable to specific ground stone types. For example, the presence of a keel and battering for manos. Only the complete ground stone were measured.

Prehistoric Ceramic Artifacts

Prehistoric ceramic artifacts were analyzed by Dr. Richard Krause, University of Alabama and the results are presented in the body of this report.

Faunal Remains

Faunal remains from this testing phase were numerous and mostly represented by domesticates that were found in Area A. Haley Harms completed the analysis of the remains and her report is presented in Appendix VI. The faunal collection housed at FLC was used as the comparative collection. Because of the diverse and extensive faunal assemblage collected from 5LA3421, other resources were used to aid in identification of remains (Gilbert 1973; Olsen 1960, 1964). Due to the similarities in size, features and physical nature of Bos taurus (cow) to Bos bison (bison) and Ovis aries (sheep) to Capra hircus (goat), identification only occurred to the subfamily level for each. With the historic record and other activity in the region of PCMS, it is quite probable, though, that these remains represent cow and sheep.

Upon completion of the analysis, the identified elements were quantified using minimum number of individuals (MNI) (Grayson 1984). Number of identified specimens was not utilized because of the criticisms and problems that surround it (Reitz and Wing 1999). Although the elements were only identified to family and subfamily levels, the MNI was still used, employing the methods defined by White (1953).

Historic Artifacts

Historic artifacts were analyzed according to the guidelines set by Dean (1992). Historic artifact categories include metal, wood, ceramic, leather, plastic, rubber, glass, textiles and shell. Metal artifacts include tin cans, cartridge casings, wire, nails and miscellaneous metal items. Ceramic artifacts identified include whiteware, ironstone and stoneware specimens. Glass artifacts were separated according to bottle and non-bottle glass. Non-bottle glass includes flat glass (window pane) and unidentifiable glass fragments. Whenever possible references were consulted to identify manufacture dates based on Maker's marks and/or datable characteristics. Although studies have suggested that general dates of manufacture can be derived from the thickness of window pane glass, the flat glass recovered from 5LA3421 was not felt to constitute a sample size (n=14) large enough to date.

Cataloging and Database Management

Catalog numbers were assigned to individual or groups of artifacts/materials according to analytical units defined by the coding process. Procedures for cataloging were established by Cowen (Pamela Cowen, personal communication 2003) at the FCMR, and are structurally similar to those provided by Dean (1992). The catalog number consists of three components; the Smithsonian site number, a three digit unique designator representing the FLC 2002 field season and a sequential three-digit number assigned to the artifact(s). Data collected on PCMS forms were entered into Microsoft Access.

Within the database, artifacts were separated into individual tables according to the transaction logs defined by Dean (1992). Each transaction log was linked to a master table by the catalog number that was created for each entry. The master database fields were dictated by the PCMS curator. This information will be available to the US Army in electronic and hard-copy versions.

CHAPTER 6
AREA A— THE LEPLATT HOMESTEAD

Location and Description

Area A is located in the lower western portion of site 5LA3421 (Figure 6.1). This Area is characterized by the presence of five historic features and a predominantly historic artifact assemblage. Formerly this portion of the site was recorded as 5LA3121 by DU (Carrillo and Mead 1984). Prehistoric artifacts and features are also present, buy to a lesser degree. The boundaries of Area A are defined by the military fence to the west and south and a small drainage to the east. The northern boundary of Area A is defined by the northern extent of historic artifacts. The historic features include a well (Feature 1), a domicile (Feature 2), a dugout (Feature 3) and two other associated outbuildings/corral (Features 4 and 5). The two prehistoric features were identified as hearths. Figure 6.2 illustrates Area A.

Archeological investigations conducted by FLC in Area A consisted initially of the mapping of the distribution of surface artifacts, as well as mapping the prehistoric and historic features. Vehicular disturbance from tactical maneuvers and identifiable test units from previous archeological excavations were also mapped. Prior to excavation, eight auger test probes (ATP)were placed across Area A to sample the stratigraphic nature and depth of the underlying sediments. A geophysical survey was conducted across sixteen 20 m -x- 20 m grids to identify the presence of subsurface geophysical anomalies. Subsurface investigations included the excavation of five 2 m x 2 m test units and two 1 m -x- 1 m test units. These test units were positioned to explore two of the historic features, as well as one magnetic anomaly and one resistance anomaly identified from the geophysical survey. The two prehistoric hearth features were fully excavated.

Historic Features

Based on similarities of construction methods and spatial associations, the historic features identified in Area A are considered to be related to the same period of historic occupation. Each historic feature represents a separate but concomitant component of a historic homestead, the Leplatt Homestead. These features are located adjacent to the confluence of Big Water Arroyo to the south and a small drainage to the east. Excluding Feature 1, the well, there is no surface evidence for a superstructure, such as walls or roofs, associated with any of these features. They are primarily represented by their structural footprint. Nor is there evidence that any such superstructure burned. This suggests that any materials utilized in the construction of a superstructure were dismantled and taken elsewhere. The remains of two wooden posts were identified in the vicinity between Feature 2 and Feature 3. It is unclear what their function or association with the other features in Area A may have been.

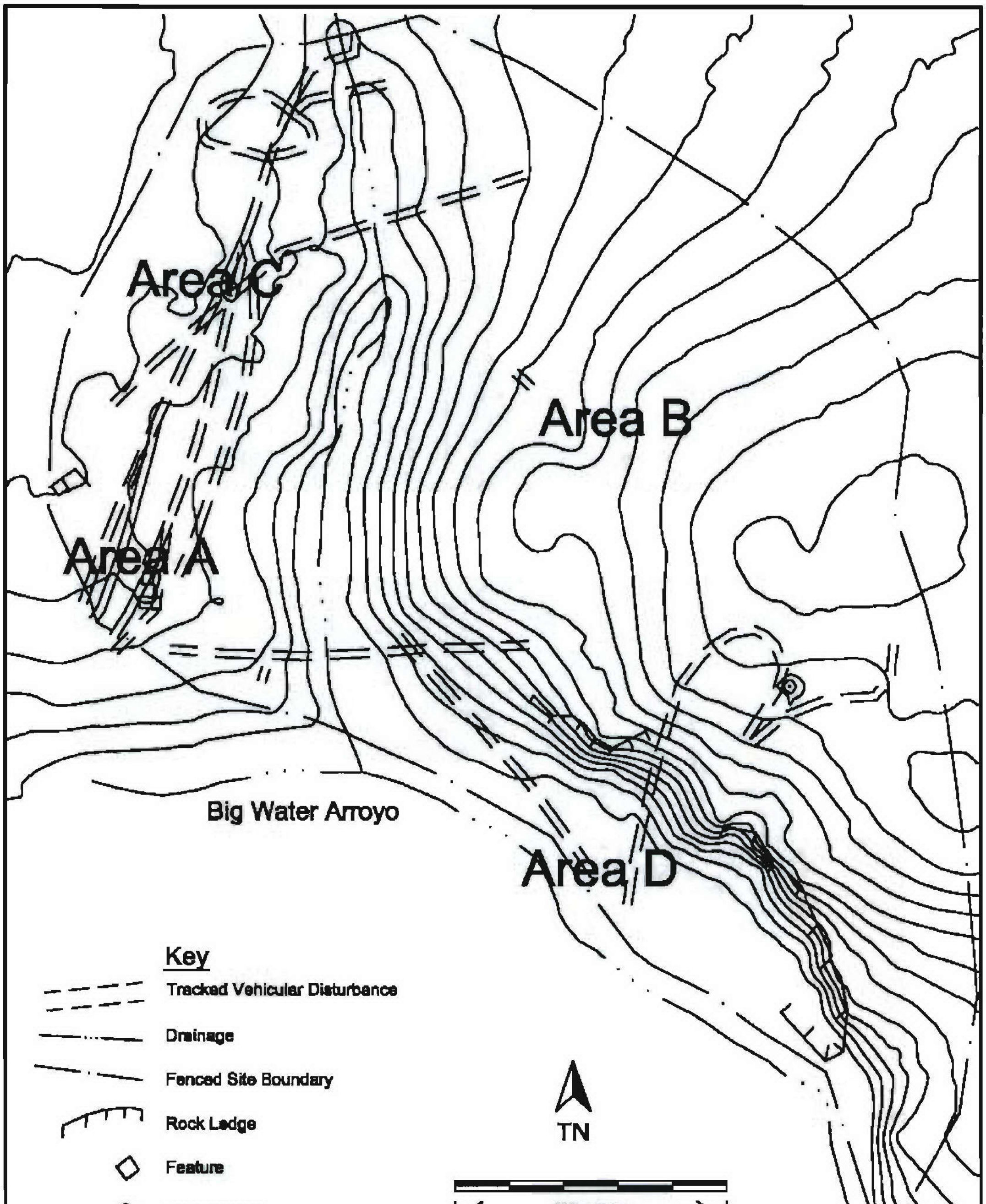


Figure 6.1. Topographic map of site areas, 5LA3421.

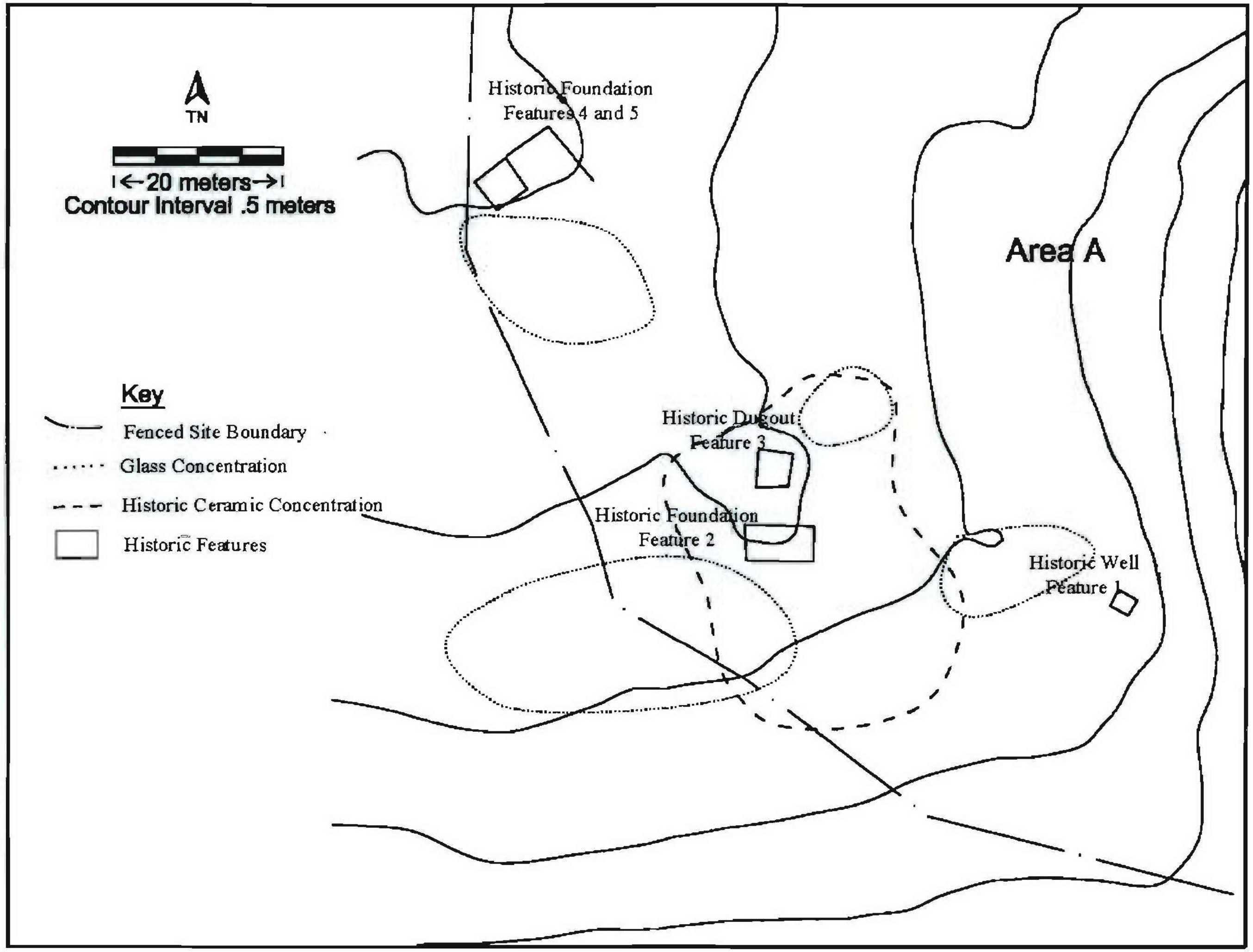


Figure 6.2. Topographic map of Area A.

Feature 1

Feature 1 is a historic well (Figure 6.3 and 6.4) located in the southeastern portion of Area A. At the surface, the opening of the well is covered by logs and milled lumber of different sizes. Its perimeter is extensively 'fenced' with a tangle of barbed and smooth wire supported by hand-hewn wooden posts. These posts may be the remains of a windmill. The walls of the well form a square and are constructed of dry-laid sandstone blocks. It roughly measures 9 feet deep and approximately 8 x 7.5 feet wide (northeast/southwest by northwest/southeast).

Figure 6.3. Feature 1, historic well, Area A.

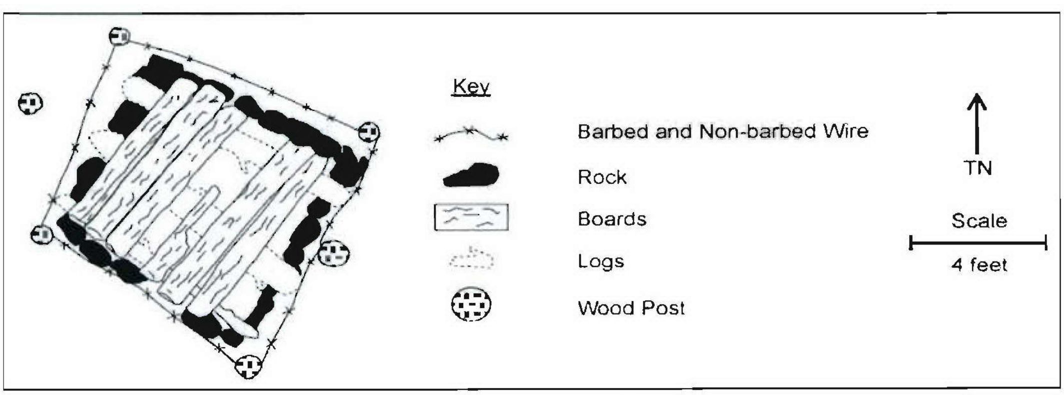


Figure 6.4. Feature 1, plan view, Area A.

Feature 2

Feature 2 is interpreted as the remains of a historic domicile (Figure 6.5 and 6.6) located in the central portion of Area A. It is represented by sandstone masonry, visible at the surface, that is suggestive of the foundation of a structure. The foundation plan is rectangular, aligned nearly perfectly with the cardinal directions and measures 14 x 28 feet (north/south by east/west). The masonry foundation is composed of rough cut, dry laid, tabular sandstone that is stacked either horizontal or vertically in irregular courses . It is constructed as a solid wall, approximately 16 inches thick, and typically no more than two stones wide. Two courses of the foundation were exposed above the ground surface. Based on the foundation footprint, this was probably a one story, linear building.

Two possible doorways of the structure were identified; one in the southwest corner of the south wall, and one on the north wall just east of center. These areas are identified as possible doorways based on the absence of foundation stones and, in the case of the south wall, the presence of a large stone suggestive of a step or stoop. The absence of a superstructure prevents the determination of the structure's orientation. Vehicular disturbance to Feature 2 from tactical maneuvers is present in the form of broken, displaced and missing foundation stones. Numerous surface artifacts are present within and surrounding this feature.

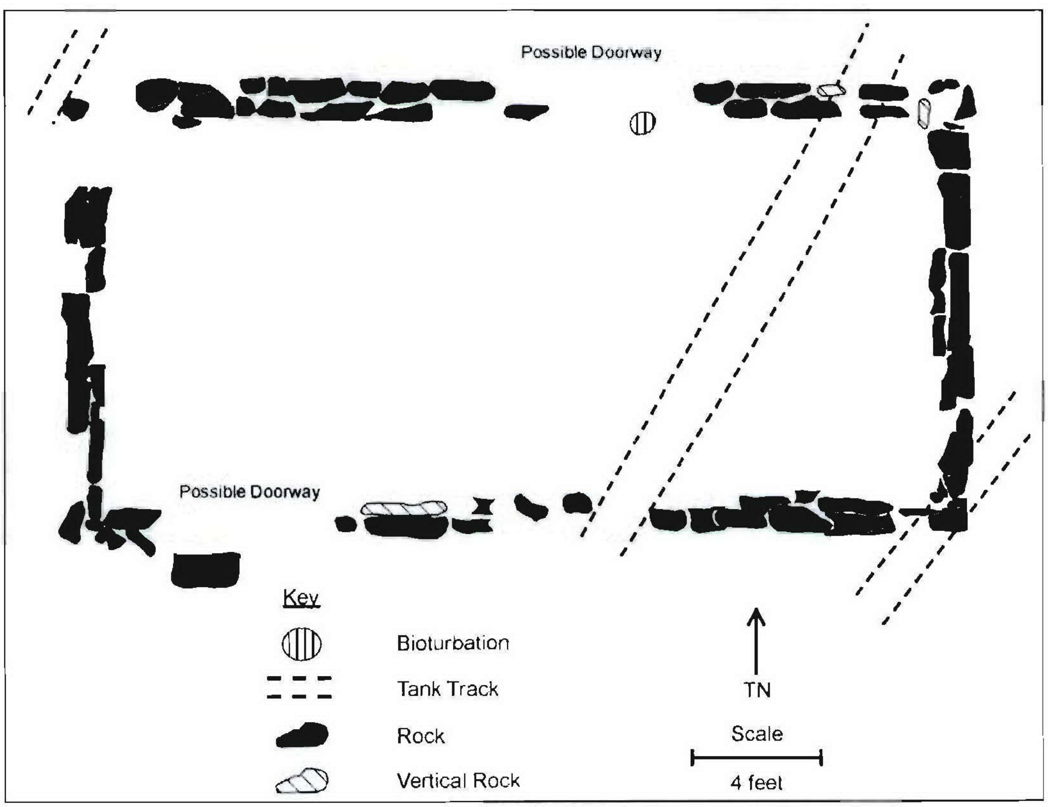


Figure 6.5. Feature 2, plan view, Area A.

Figure 6.6 Feature 2 and Feature 3, Area A.

Feature 3

Feature 3 is interpreted as a historic dugout (Figure 6.6 and 6.7) located in the central portion of Area A and directly north of Feature 2. It is represented by dry laid, tabular sandstone masonry that is visible at the surface. Some stones are quite large,

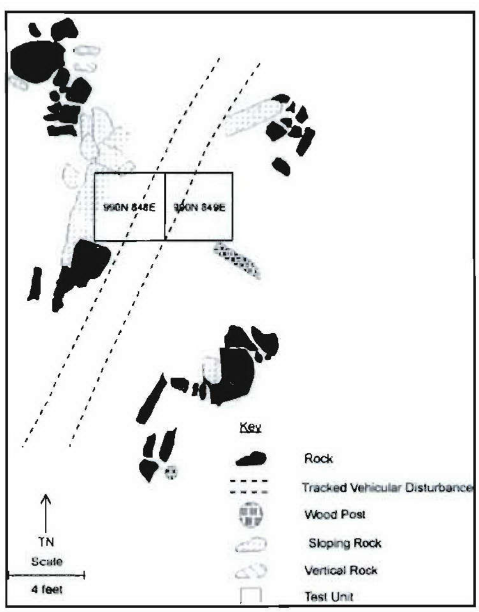


Figure 6.7 Feature 3, plan view, Area A.

being of boulder size, and many are sloping inward suggesting they were previously in a vertical position. The center of the structure was approximately 1 m below the surrounding ground surface. The stone outline is roughly rectangular, measuring approximately 15 x 12 feet (north/south by east/west). These dimensions are an estimate of the structures original size based on the disturbed and displaced sandstone blocks composing its perimeter. Vehicle disturbance from tactical maneuvers is present in the form of broken, displaced and missing foundation rocks. Numerous surface artifacts are present within and surrounding this feature.

Feature 4 and Feature 5

Features 4 and 5 are interpreted as being historic structures associated with livestock, such as a corral and/or outbuildings related to the homestead (Figure 6.8). They are located in the northwest portion of Area A. The foundation plan for Feature 4 is roughly square, measuring approximately 15 x 14 feet (north/south by east/west). The individual foundation stones range from small, angular pieces to large, tabular sandstone blocks composing a masonry wall of rough cut, tabular sandstone. These are dry laid, up to multiple stones wide ranging from 1 to 1.5 feet in width. The foundation plan for Feature 5 is L-shaped, measuring approximately 20 x 20 feet. Its western edge abuts the northeast corner of Feature 4, thereby sharing a wall between the two. The individual foundation stones are a mixture

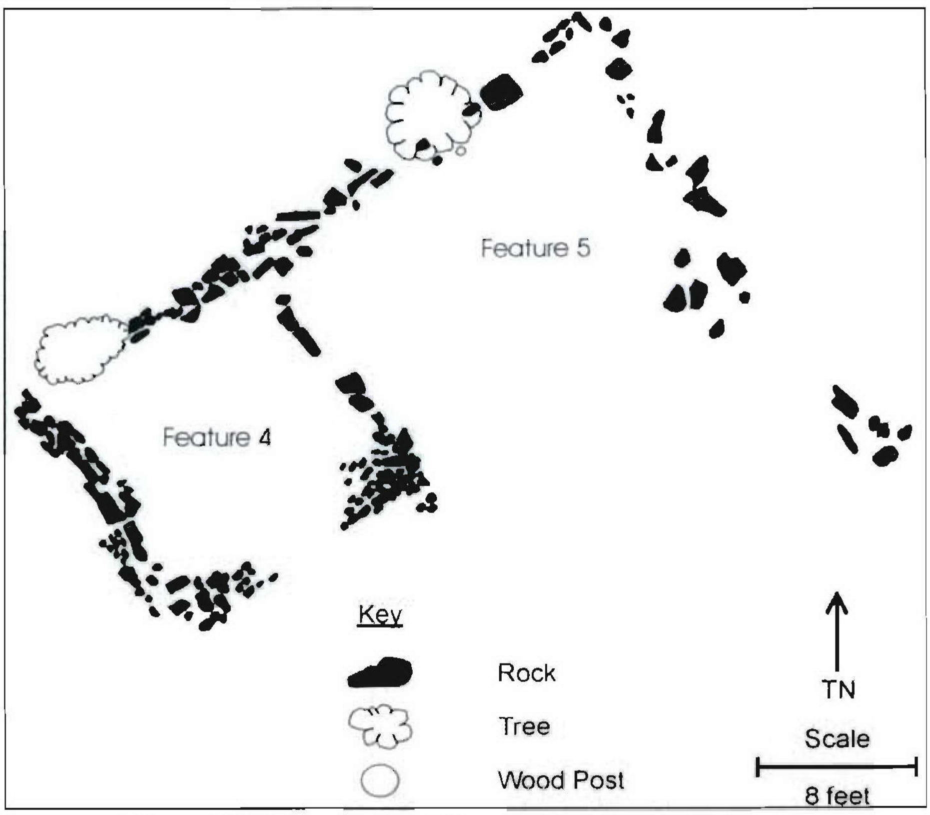


Figure 6.8. Feature 4 and Feature 5, plan view, Area A.

of angular and tabular sandstone blocks of varying size. These are dry laid and at least two stones wide. An isolated elderberry tree is growing out of the north wall of Feature 5. Vehicular disturbance from tactical maneuvers is less apparent in the vicinity of Features 4 and 5 than elsewhere in Area A. Numerous surface artifacts are present, primarily to the south of these features.

Prehistoric Features

Two prehistoric hearth features were identified along the eastern portion of Area A. They were represented by charcoal stained areas surrounded by surface concentrations of fire altered rock, in an area no more than 1 m square. Although both features were deflated and disturbed, Hearth 1 (Figure 6.9) was less compromised by surface disturbances.

Figure 6.9. Hearth 1, Area A.

Historical Research

Historical research was conducted as a complementary activity to the archeological testing at site 5LA3421. The goal of the historic research was to identify ownership of the homestead, the types of activities engaged in at the homestead and to recreate the sequence of events that led to the historic settlement and ultimately abandonment of the homestead. A number of sources were consulted during the historical research for this project. These include archival sources such as the General Land Office (GLO) Records of the Bureau of Land Management (BLM) and the Federal Population Census. In addition, personal

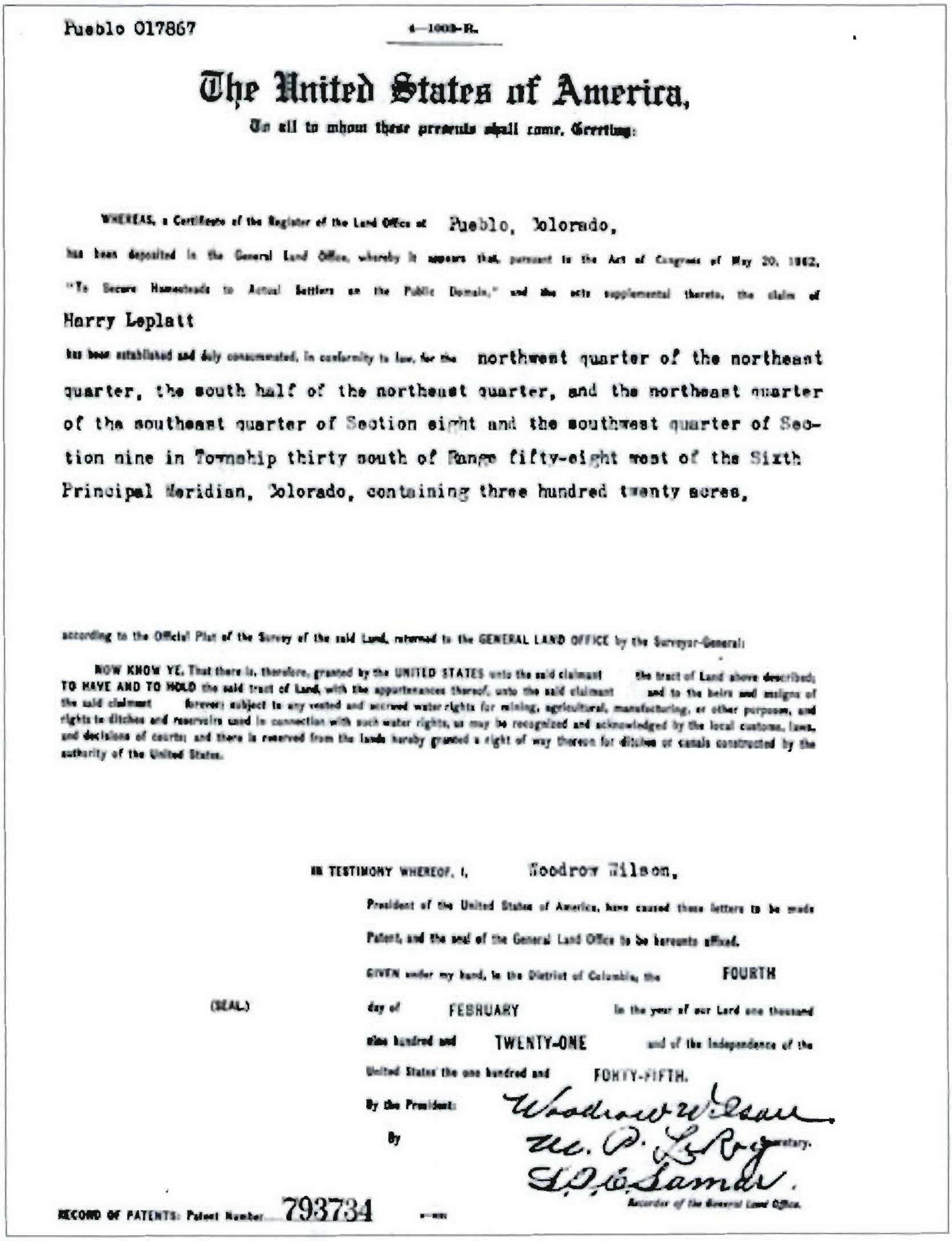
interviews were conducted with members of the family believed to be associated with the historic component of the site. As a means of tying these sources together, Friedman (1985) serves as an excellent resource by interpreting the large pattern of historical human behavior at Pinon Canyon.

The GLO Records of the BLM (www.glorecords.blm.gov/) provide data concerning the initial transfer of land titles from the Federal government to individuals. These land patents make it possible to associate individuals with a particular place (legal land descriptions), at a particular time (issue dates) and indicate something of the nature of land use (title transfer authority). Despite the limitations of using GLO Records to corroborate or confirm the nature and identity of historic archeological sites within the PCMS, there are several lines of evidence that may be followed to lend credence to such corroboration. For example, in order to 'prove up' a homestead claim the patentee was required to have settled the land and have made improvements as pertained to the particular title transfer authority. On average this process spanned five years from initial occupation to land patent transfer. Friedman (1985: 24-25) suggests that given the labor investment necessary to make the improvements, such as building a substantial residence, the owner would want to protect that investment by acquiring legal title to the land through a patent; and as such, it is more than likely that the individual who patented the land was the same person who lived in the house on the property.

According to the BLM-GLO Records, on February 4, 1921 Harry Leplatt was issued a patent for 320 acres of land in Las Animas county (Document Number 017867) (Figure 6.10) under the authority of the Homestead Act of 1862 (12 Stat. 392). This parcel of land lies within Township 30S Range 58W and incorporates portions of both Sections 8 and 9. This property follows a stretch of Big Water Arroyo, with the bulk of the property located on the south side of the arroyo. Of interest to this report is that site 5LA3421 (5LA3121) is the only historic site recorded within the boundaries of the land patent issued to Harry Leplatt. Site 5LA3421 (5LA3121) is located in the very southeastern portion of the parcel of land and consists of structures that are considered associable to a homestead claim. Following Friedman's (1985) line of reasoning, it is probable that the historic structures of 5LA3421 (5LA3121) represent the original homestead of Harry Leplatt.

On January 25, 1926 Harry Leplatt was issued a second patent for an additional 320 acres of land in Las Animas County (Accession/Serial Number 973303) under the authority of the Stock Raising Homestead Act of 1916 (39 Stat. 862). This parcel of land incorporates portions of both Sections 8 and 17 in Township 30S Range 58W. It abuts the original homestead claim along its southwest border and continues south towards Taylor Arroyo.

The BLM-GLO Records indicate that Harry Leplatt was the last of four Leplatt



Pueblo 017867

4—1003-R.

The United States of America,

To all to whom these presents shall come, Greeting:

WHEREAS, a Certificate of the Register of the Land Office at Pueblo, Colorado, has been deposited in the General Land Office, whereby it appears that, pursuant to the Act of Congress of May 20, 1862, "To Secure Homesteads to Actual Settlers on the Public Domain," and the acts supplemental thereto, the claim of

Harry Leplatt

has been established and duly consummated, in conformity to law, for the northwest quarter of the northeast quarter, the south half of the northeast quarter, and the northeast quarter of the southeast quarter of Section eight and the southwest quarter of Section nine in Township thirty south of Range fifty-eight west of the Sixth Principal Meridian, Colorado, containing three hundred twenty acres,

according to the Official Plat of the Survey of the said Land, returned to the GENERAL LAND OFFICE by the Surveyor-General:

NOW KNOW YE, That there is, therefore, granted by the UNITED STATES unto the said claimant the tract of Land above described; TO HAVE AND TO HOLD the said tract of Land, with the appurtenances thereof, unto the said claimant and to the heirs and assigns of the said claimant forever; subject to any vested and accrued water rights for mining, agricultural, manufacturing, or other purposes, and rights to ditches and reservoirs used in connection with such water rights, as may be recognized and acknowledged by the local customs, laws, and decisions of courts; and there is reserved from the lands hereby granted a right of way thereon for ditches or canals constructed by the authority of the United States.

IN TESTIMONY WHEREOF, I, Woodrow Wilson, President of the United States of America, have caused these letters to be made Patent, and the seal of the General Land Office to be hereunto affixed.

GIVEN under my hand, in the District of Columbia, the FOURTH day of FEBRUARY in the year of our Lord one thousand nine hundred and TWENTY-ONE and of the Independence of the United States the one hundred and FORTY-FIFTH.

(SEAL.)

By the President: Woodrow Wilson

By M. P. LeRoy, Secretary.

L. Q. C. Lamar, Recorder of the General Land Office.

RECORD OF PATENTS: Patent Number 793734

Figure 6.10. Land patent transfer document for Harry Leplatt.

family members (possibly siblings) to be issued land patents in this area. Herbert, Amile and Louis Leplatt had previously been issued land patents in 1913, 1914 and 1916, respectively. The Amile Leplatt homestead was located southeast of the Harry Leplatt homestead and just south of the confluence of Big Water Arroyo and Taylor Arroyo. This homestead consists of three issued land patents for a total of 640 acres. Both the Louis Leplatt and Herbert Leplatt homesteads were located in the adjacent Township to the south (T 31S, R 58W) and were composed of one issued land patent each of 320 acres and 160 acres, respectively. Table 6.1 provides the details for each of these land patents.

Table 6.1 Details concerning other area land patents.

				Legal Land Description			
Patentee	Issue Date	Doc. #	Access. /Ser.#	Township and Range	1/4 Sections	Title Transfer Authroity	Acres
LePLatt, Herbert	10/27/1913	04735	362283	T 31S R 58W	SW 1/4 of SE 1/4 os Section 19, W 1/2 of NE 1/4 of Section 30, Nw 1/4 of SE 1/4 of Section 30	Homestead Act of 1862 (12 Stat. 392)	160
Leplatt, Amile E.	6/23/1914	01750	416683	T 30S R 58W	E ½ of SE 1/4 of Section 22, SW 1/4 of SW 1/4 of Section 23, NE 1/4 of NE 1/4 of Section 27	Homestead Act of 1862 (12 Stat. 392)	160
	4/11/1922	028745	858473	T 30S R 58W	SW 1/4 of SE 1/4 of Section 22, E ½ of SW 1/4 of Section 22, SE 1/4 of NW 1/4 of Section 22	Honestead Act of 1862 (12 Stat. 392)	160
	4/11/1922	035666	858474	T 30S R 58W	W ½ of SW ½ of Section 22, NW 1/4 of SE 1/4 of Section 22, NW 1/4 of SW 1/4 of Section 23, SE 1/4 of SW 1/4 of Section 23, W ½ of NW 1/4 of Section 26, SE 1/4 of NW 1/4 of Section 26	Stock Raising Homestead Act of 1916 (39 Stat. 862)	320
LePlatt, Louis	1/11/1916	-	-	T 31S R 58W	N ½ of NE 1/4 of Section 9, SE 1/4 of NE 1/4 of Section 9, SW 1/4 of Section 4, NE 1/4 of SW 1/4 of Section 4	-	320
LePlatt, Harry	2/4/1921	017867	793734	T 30S R 59W	NW 1/4 of NE 1/4 of Section 8, S ½ of NE 1/4 of Section 8, NE 1/4 of SE 1/4 of Section 8, SW 1/4 of Section 9	Homestead Act of 1862 (12 Stat. 392)	320
	1/25/1926	-	973303	T 30S R 58W	W ½ of SE 1/4 of Section 8, SE 1/4 of SE 1/4 of Section 8, NE 1/4 of Section 17, NW 1/4 of SE 1/4 of Section 17	Stock Raising Homestead Act of 1916 (39 Stat. 862)	320

The Federal Population Census is reproduced on microfilm by the National Archives and Records Administration. These records are arranged by state and thereunder by county and finally by enumeration district. Enumeration districts were the areas an enumerator (census taker) covered in taking the census. The Federal Population Census provides detailed information relating to households and their occupants, such as location of abode and tenure, relationship of occupants, personal descriptions, citizenship, education, nativity and mother tongue, and occupation. Census data research was confined to the Leplatt family name in Las Animas County for the years between 1890 and 1920. Specific entries in the census data for Harry Leplatt were not identified, although a number of other Leplatt family members were found.

The first encounter with the Leplatt family name occurs in the 1900 census data for Las Animas County (National Archives Publication: T623 Roll 126). Three entries were identified exhibiting three separate spellings (Herbert J. Le Plat, Emile Leplat and Emil Liplat Jr.). Spellings also differed between the Soundex census name index entries and the census data for the same individual. All three of these entries share France as a common place of birth. Their recorded immigration dates range from 1880 for Emile and 1890 for Herbert J., indicating that members of the Leplatt family had resided in the United States for at least twenty years. Occupations include coal miner (Emile Jr.) and farmer (Herbert J.). Of particular interest are the children of Herbert J. Le Plat, four of which have names that match (or in one case nearly match) the patentee names from the GLO-BLM Records discussed above: Herbert J. (born 1883), Emile (born 1887), Louis (born 1889) and Harry (born 1892).

In the 1920 census data the Leplatt family name occurred five times exhibiting yet two other alternate spellings (A.E. Le Platte, Gust(?) Leplatt, Herbert Leplatt, Herbert L. Leplatt and Louis L. Leplatt) (National Archives Publication: T625 Roll 166). Again, all four of these entries share France as a common place of birth. Occupations include farmer (Herbert L.), homesteader (A.E.) and machinist (Louis L.). Based on their recorded ages from the census data, project staff attempted to correlate these individuals through time. Despite some (apparently common) differences in spelling, it appears that Herbert may be the same as Herbert J. from the 1900 census, Louis L. may be the same as Louis, the son of Herbert J. from the 1900 census, Herbert L. may be the same as Herbert J., the son of Herbert J. from the 1900 census, while A.E. may be the same as Emile, the son of Herbert J. from the 1900 census. The nearest correlation for the name Gust(?) Leplatt occurring in the 1900 census data is the entry for Gustave Leplas, an unwed coal miner with no children. Despite the entry for Gust(?) Leplatt in the 1920 census data, it appears that only Herbert J. Leplatt and a few of his children remained in the area by 1920.

When the Leplatt name surfaced through the archival research, a search for any Leplatt family members presently residing in the general area was conducted. Several family members were located in the Trinidad area and personal interviews were conducted over the telephone with them. These interviews provided the following general historic information specifically concerning the family of Herbert J. Leplatt originally identified in

the 1900 Federal Population Census data.

The Leplatt family, including at least seven children, emigrated from France in the late 1800's and settled in the area of Hoene, Las Animas County. At least one of the Leplatt children remained in France and a few others were born after arriving in America. Four of the Leplatt children (Louis, Harry Porter, Emile and Nellie) homesteaded in the area now referred to as the PCMS. Harry, Emile and Nellie homesteaded three separate 160 acre patents in the area of Brown's Sheep Camp and Louis homesteaded up near Big Water Arroyo. Nellie is said to have married Ben Edwards (and presumably left the area). Emile moved to California and eventually returned to the Four Corners region of the Southwest. Harry Porter moved to Trinidad working as a cowboy and picking up odd jobs. At least one of Harry Porter's children, Leroy Leplatt, resided in Trinidad during the 2002 FLC field season. Leroy was born circa 1917 (apparently at the Harry Leplatt homestead), and moved from the homestead when he was three years old.

Historical Context

Through integrating the separate lines of evidence discussed above, not only do the origins of the historic component of site 5LA3421 (5LA3121) become clearer but a broader contextual pattern of human behavior associated with the site becomes more apparent. The following narrative is a summation of the evidence and information gathered through the historical research.

By 1900, several families bearing the Leplatt surname (in one form of spelling or another) had settled in Las Animas County. Based on their occupations, they presumably were drawn to the available jobs resulting from the expansion of the coal industry, or to the promise of dry farming homesteads. As Friedman notes:

> Due to changes in federal homesteading laws, a few years of good rainfall, the advent of dry farming techniques, climbing agricultural prices, and the promotion of the railroads, thousands of new settlers were attracted to the plains of southeastern Colorado. (Friedman 1985: 118)

The census data indicate that not all of the Leplatt families remained in the area, although several members of one family in particular did remain and can still be found in the Trinidad area as late as 2002. In 1900, fifty-two year old Herbert J. Leplatt and his 46 year old wife Polly L. were recorded as living in Precinct 16 (El Moro) of Las Animas County. They had emigrated from France approximately ten years earlier with five of their children: Herbert (age 17 years), Polly (age 15 years), Emile (age 13 years), Louise (age 11 years) and Louis (age 10 years). Subsequently, the couple had four more children after settling in Colorado: Harry (age 8 years), Nellie (age 5 years), Dora (age 2 years) and Annie (age 8 months). At this time Herbert J. Leplatt was a farmer and his eldest son, Herbert was employed as a farm laborer. The middle four children (Emile, Louise, Louis and Harry) were currently enrolled at school.

By 1913, Herbert, the eldest son of Herbert J. Leplatt, was issued a land patent for 160 acres located approximately two miles southwest of the junction of Van Bremer Arroyo and the Purgatoire River. He was 30 years old at the time. This homestead would become the first of four homesteads in the general area issued to children of Herbert J. Leplatt. Herbert was soon followed by Amile (probably a variation of Emile) in 1914 with 160 acres and Louis with 320 acres in 1916. Their homesteads were located slightly further to the northeast. At the time, they were twenty-seven and twenty-six years old, respectively. It wasn't until 1921 that youngest son Harry Leplatt settled along Big Water Arroyo with 320 acres. He was 29 years old at the time. It is believed that the historic structures of site 5LA3421 (5LA3121) represent the original homestead of Harry Leplatt.

These homesteads were settled and occupied during the historical framework of the Later American Period (1891-1984). Within the PCMS this period was characterized by the continued development of the livestock industry. All four of the Leplatt land patents are recorded as being transferred under the authority of the Homestead Act of 1862 (12 Stat. 392). Additional land patents were issued to both Amile (in 1922) and Harry (in 1926) under the authority of the Stock Raising Homestead Act of 1916 (39 Stat. 862), raising their total homestead acreage to 640 acres apiece. The acquisition of multiple land patents was not uncommon for the region at this time, particularly those issued under the Stock Raising Homestead Act. Settlers who homesteaded this area with the intent of dry farming found the arid environment inhospitable and often turned to ranching. As either farmers or ranchers, settlers quickly found that a single claim was not sufficient enough to survive in this part of the country.

As Friedman suggests:

> Most [homesteaders] had to plow 40 acres to meet the requirements of the homesteading laws. Those who attempted to dry farm for a living soon discovered that it was almost impossible to do so. They might have gotten a few years of good crops, but then the drought of the late 1920's hit. In order to survive, these homesteaders had to readjust and become livestock ranchers. (Friedman 1985: 174)

Of the four Leplatt homesteaders, it seems that the raising of livestock was a later endeavor practiced by only Amile and Harry. Both Herbert and Louis were never issued additional land patents, and by 1920 it appears they may left the immediate area and their homesteads. In fact, the 1920 census records indicate that Herbert and Louis were then residing in Trinidad. Herbert was living on the same block as his father, Herbert J., and employed as a farmer, while Louis was employed as a machinist at a garage.

The longevity of the Amile and Harry Leplatt homesteads no doubt relied on their ability to adapt to difficult situations. But, as Friedman notes:

> Many of the homesteaders began giving up their claims and selling out to the

> ranchers around 1924, when a drought hit the region... The dry years of the late 1920's combined with falling agricultural prices, started the exodus of the homesteaders from the PCM[S]. This was greatly accelerated by the depression of the 1930's. Southeastern Colorado was on the border of what became famous as the "Dust Bowl." Many homesteaders simply could not make a living, and sold out or abandoned their claims. (Friedman 1985: 125)

Eventually, Amile left his homestead for California and Harry moved to Trinidad and worked as a cowboy for the Circle Diamond as well as picking up other odd jobs. Harry is survived by at least one son, who was living in Trinidad as late as 2002.

Historical Summary

The historical data suggest that the origins of the historic component of 5LA3421 (5LA3121) relate to the Harry Leplatt Homestead, patented in 1921. The homestead may have been established to dry farm along Big Water Arroyo, although subsequent land use was tailored towards raising livestock. Occupation of the homestead may have occurred as early as 1916, assuming a five year "prove-up" period. Leroy, the son of Harry Leplatt, claims that he was born at the homestead, establishing occupancy circa 1917. Leroy claims to have left the homestead circa 1920, suggesting that Harry Leplatt may have made the transition to raising livestock by this time. Friedman (1985:164) indicates that there was a significant amount of absentee landownership within the PCMS by 1920 as a result of economic hardships and climatic conditions. Oral history testimony from other PCMS homesteaders of this era indicate that landowners resided at their ranches part of the time and had ranch foreman operate them the rest of the time, or they leased their land to neighboring ranches (Friedman 1985: 166). Harry Leplatt may have followed a similar scenario by 1920 of no longer residing at the homestead although retaining ownership.

Surface Investigations

A pedestrian inventory was systematically conducted across Area A and outside the original site boundaries to the southwest. This additional area was included because historic artifacts were visible on the surface. All surface artifacts were pinflagged and mapped with the Total Station (Figure 6.11). Historic artifacts include 2 buttons, 2 cartridge casings, 69 historic ceramics, 1 nonhuman bone, 133 pieces of glass, 27 fragments of miscellaneous metal, and 4 tin can fragments. Prehistoric artifacts include 2 ground stone and 39 flaked-lithic artifacts. Fourteen diagnostic or unusual artifacts were collected from the surface. These include the two cartridge casings, one metal 'button', nine specimens of worked glass, and two bottle finish fragments. Concentrations of individual artifacts classes were

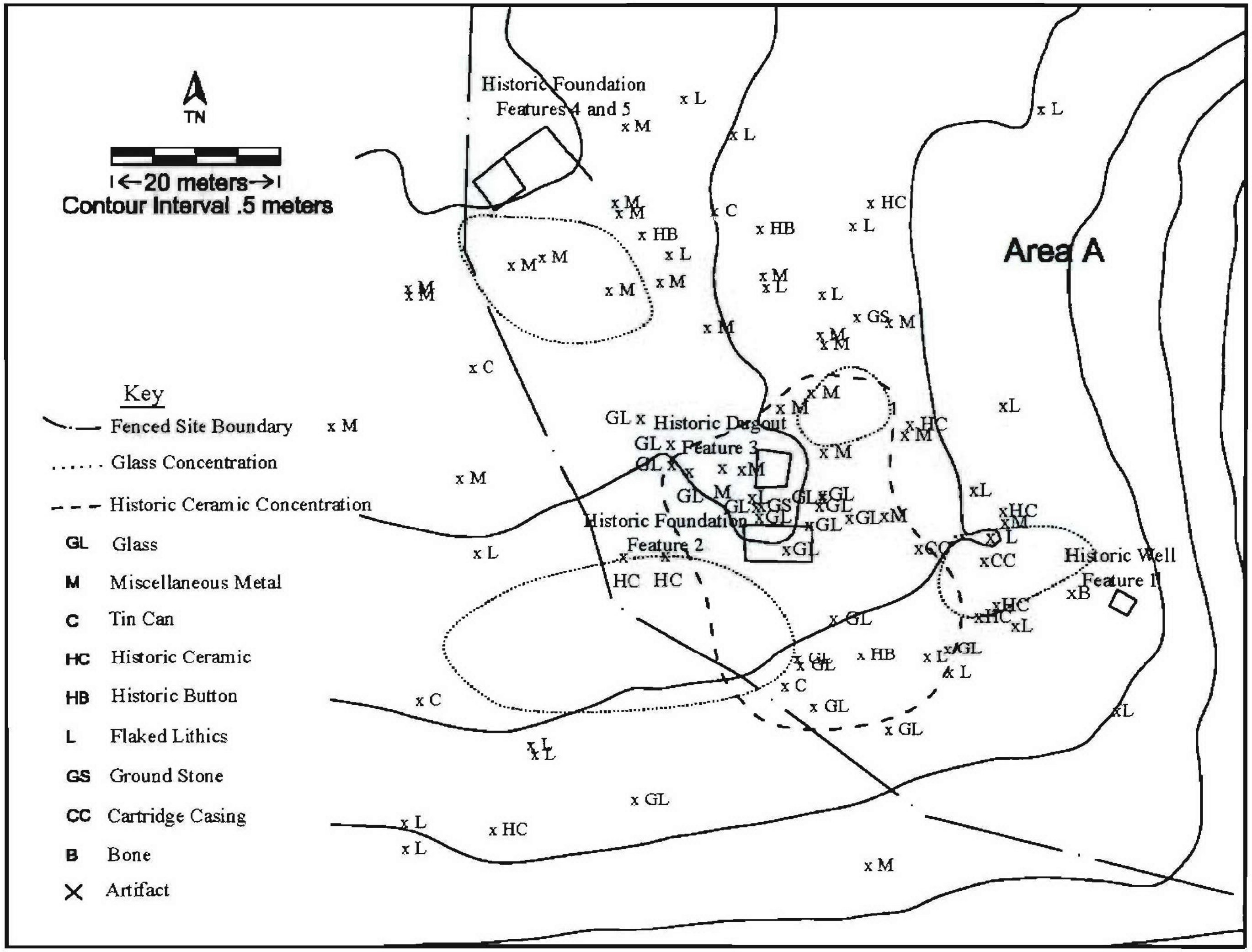


Figure 6.11. Map of surface artifacts, Area A.

identified across Area A. For example, concentrations of glass occur directly to the south of Feature 4 and Feature 5 as well as adjacent to Feature 1. Fourteen historic artifacts, including worked glass, were collected from the surface.

Remote Sensing

Two geophysical surveys were conducted in Area A. These include a gradiometer survey and an electrical resistance survey. Grids were set in with the Total Station and each was 20 m x 20 m in area. A total of 16 grids were surveyed (Figure 6.12). The methods and techniques for the geophysical surveys are presented in Chapter 5.

The purpose of these surveys was to cover a broad area that included the surface features to determine subsurface features that were not a part of the visible landscape. For example, we had not been able to identify a privy from the surface features. We hoped that the geophysical surveys would enlighten us to the total extent of the site. Through identification of buried features and artifacts, we hoped to more thoroughly interpret the function of the site. Secondly, two prehistoric hearth were exposed on the surface as a result of erosion and vehicular disturbance. We anticipated that if the conditions were right, that we could identify more hearths at the site.

As a result of the remote sensing surveys we were able to more clearly examine the extent of subsurface features and artifacts, particularly those containing ferrous materials. Features 4 and 5, which we had initially interpreted as possibly related to animal husbandry, showed an extensive amount of iron artifacts in and around the features (Figure 6.13). This concentration of iron objects could be related to tack, wagon parts, fencing materials, etc., which supports the interpretation that these were related to stock raising. Very clear on both geophysical maps (Figure 6.13 and 6.14) are paths that lead from the well to Features 4 and 5, again supporting the idea of stock raising. We interpret Feature 4 to be the remains of a work shed and Feature 5 to be a corral. The magnetic data identified a strong magnetic anomaly in the area of the dugout, which turned out to be a concentration of barbed wire, most likely put in the dugout well after its abandonment since the wire was in the upper portions of the fill. The historic dugout appears as a low resistance feature. This is likely from the increase in moisture that could accompany the sediments in a depression such as a dugout. A general area of enigmatic resistance reading is present in the northeast corner of the survey area. We believe this pattern to reflect extensive bioturbation, which is apparent from the surface. Resistance reading in the southeastern and southern portion of the grid survey show alternating high and low reading. At the conclusion of our testing and in consultation with the geomorphologists, we believe that these reading possibly reflect the relict gypsum soil that lies buried beneath several centimeters of more recent soil.

The hearth features were not identified in either survey. Although the features contained charcoal and fire-cracked rocks, the sediments were not heavily oxidized. The fact that these did not show in the magnetic data suggests that the sediments and local parent

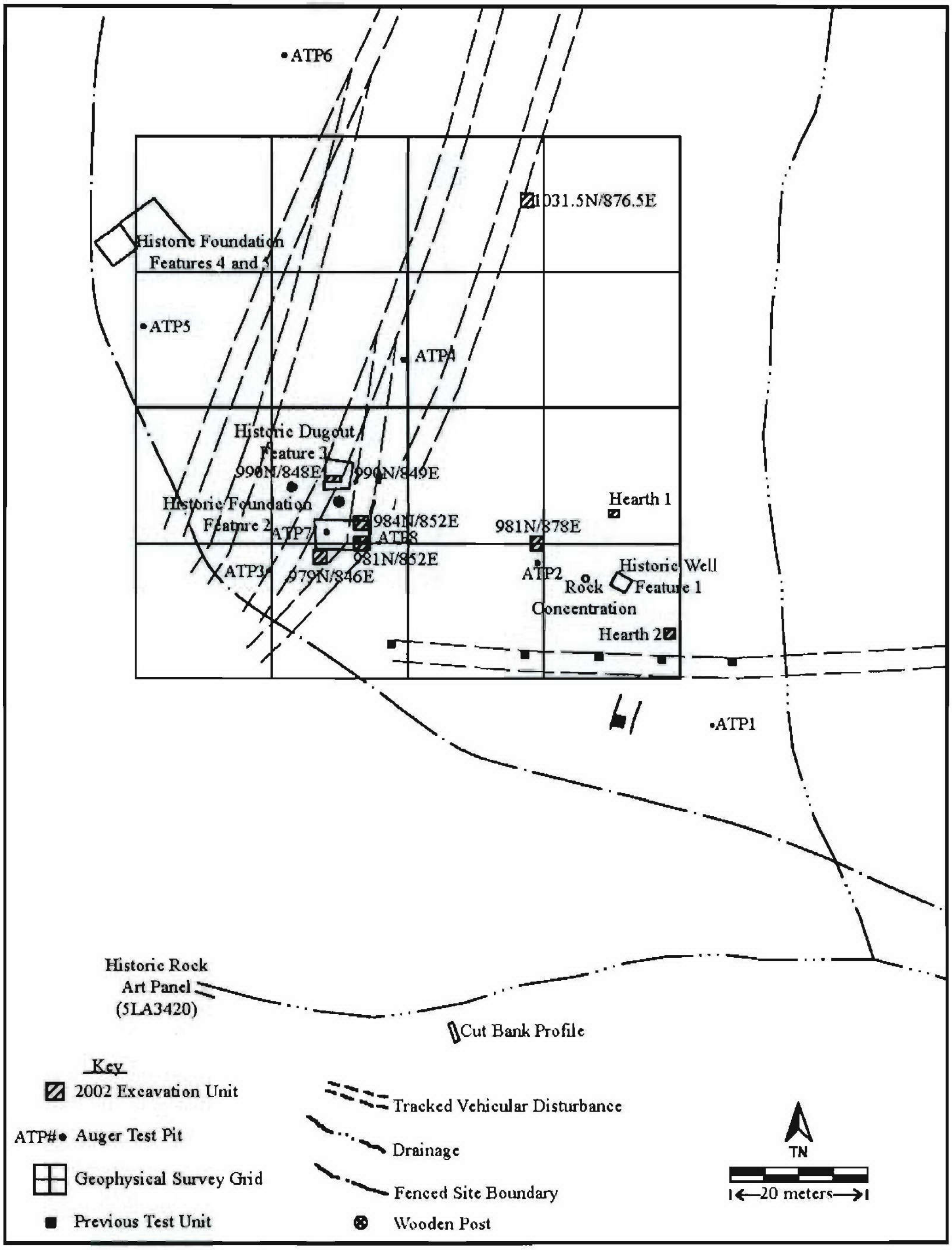


Figure 6.12. Location of remote sensing grids, Area A.

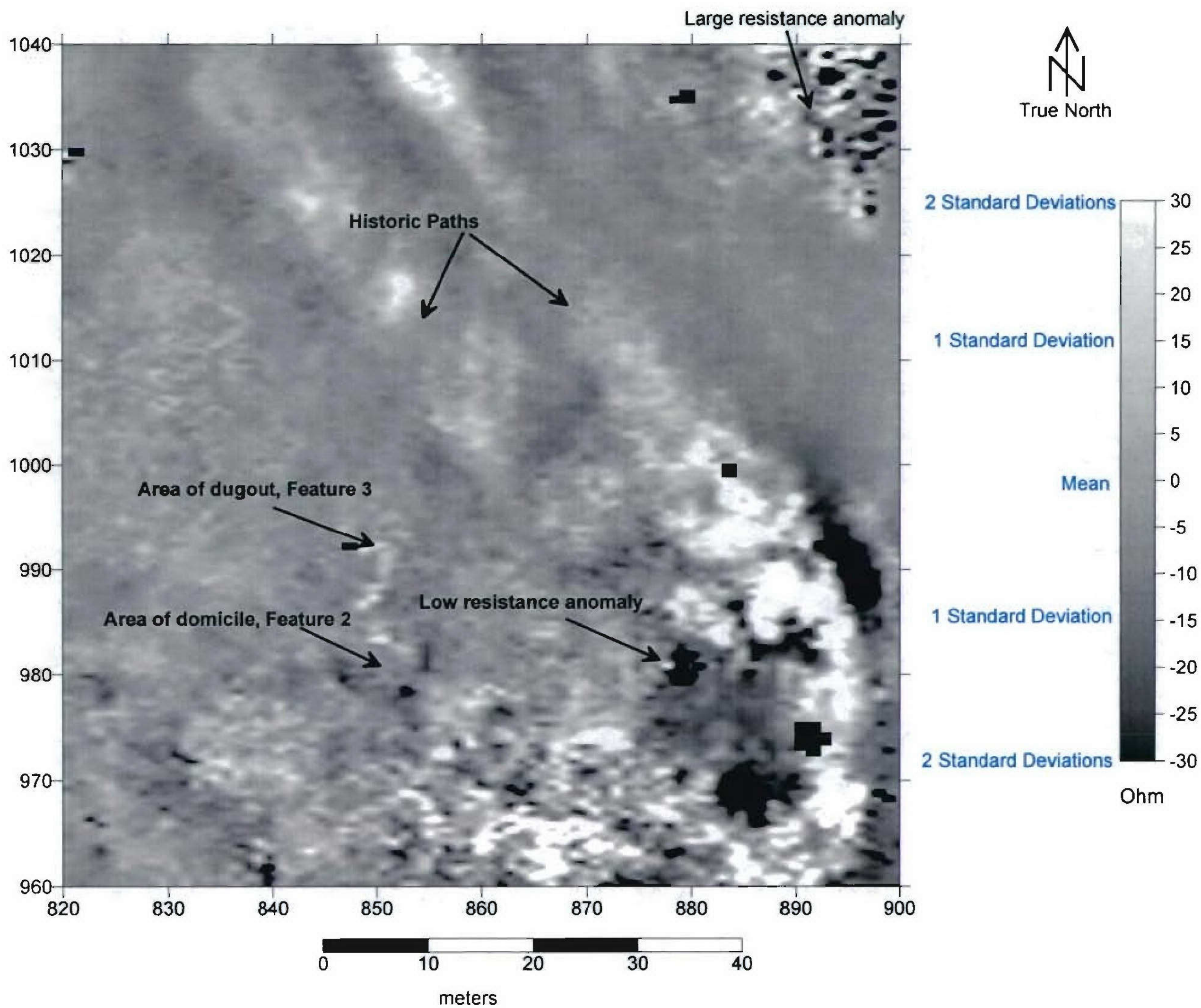


Figure 6.13. Map of results of electrical resistance survey, Area A.

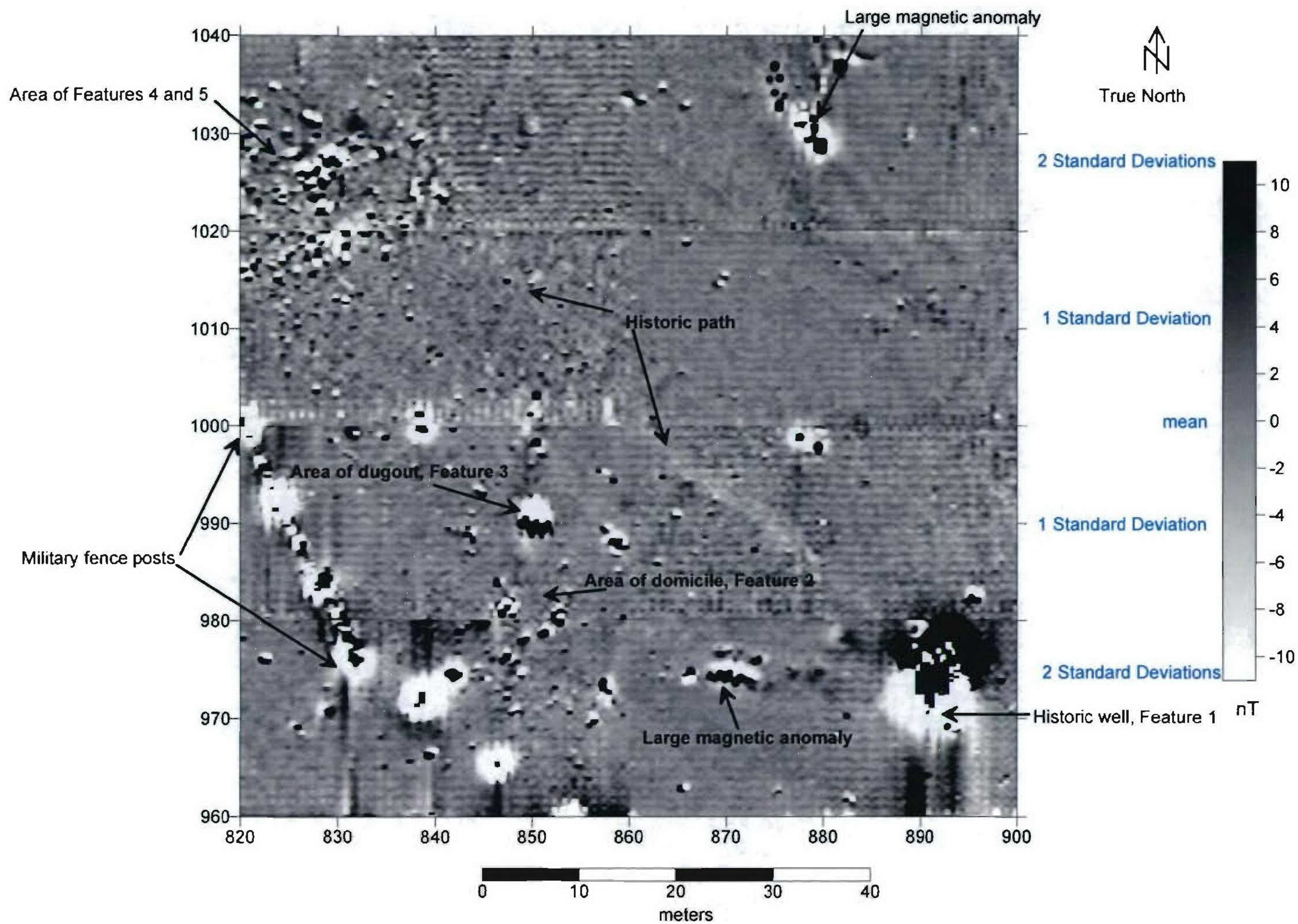


Figure 6.14. Map of results from gradiometer survey, Area A.

materials contain little ferrous materials and display little to no remnant magnetism. Two areas of geophysical anomalies were singled out for subsurface testing. The results of these tests are presented in this chapter under subsurface investigations.

Subsurface Investigations

Auger Test Probes (ATP)

Eight ATPs were randomly placed across Area A to sample the stratigraphic nature and depth of the underlying sediments (Figure 6.2). Two of the eight test probes were placed within historic Feature 2, the domicile, to identify the maximum depth of cultural deposits within the domicile. The remaining six test probes were spread over Area A. The test probes were 10 cm in diameter, and ranged in depth from 18 to 260 cm bgs. No artifacts were recovered from these probes, although ATP 7 and ATP 8 positioned within Feature 2 encountered tabular sandstone at approximately 15 to 18 cm bgs. At a similar depth in ATP 8, a portion of a large mammal bone was encountered extending beyond the diameter of the test probe. Beyond 15 to 18 cm bgs within Feature 2, the sediments were consistent with those found across the remainder of the site suggesting a maximum depth of cultural deposits for Feature 2 at approximately 18 cmbgs. Results from the ATP's identified the potential for subsurface cultural deposits within the historic features of Area A.

Test Unit Excavations

A total of five 2 m x 2 m test units, two 1 m x 1 m test units, and two prehistoric hearth features were excavated in Area A. These test units are referred to by the coordinates of their northwest corner in relation to the main site datum (1000N, 1000E). Table 6.2 summarizes the individual test unit locations, size, total layer/levels excavated and final depths below ground surface. Three test units were positioned to investigate Feature 2, two test units were positioned to investigate Feature 3 and two test units were positioned to investigate anomalies identified during geophysical prospecting. Two additional grid units were placed over the prehistoric hearth features. The following test unit discussions are organized according to their associated locations. The division in discussion between layers and strata was retained to preserve the specific data recorded for each. Correlations between these stratigraphic units were made whenever possible.

Table 6.2. Test unit results, Area A.

Test Unit	Location	Size (m)	Layers	Levels	Final Depth (cmbgs)
979N/846E	Feature 2	2 -x- 2	2	4	19
981N/852E	Feature 2	2 -x- 2	3	4	32
984N/852E (inside)	Feature 2	2 -x- 2	3	7	35.5
984N/852E (outside)			2	6	48
990N/848E	Feature 3	1 -x- 1	3	4	37
990N/849E	Feature 3	1 -x- 1	5	12	107
1031.5N/876.5E	Mag. Anom.	2 -x- 2	2	7	52
981N/878E	Res. Anom.	2 -x- 2	2	4	40
984.9118N/889.5355E	Hearth 1	1 -x- 1.5	Full Cut		20
967.3086N/897.7135E	Hearth 2	1.5 -x- 1.5	Full Cut		8

Feature 2 Excavations Three 2 m x 2 m test units (979N/849E, 981N/852E and 984N/852E)

were placed within or adjacent to Feature 2, the domicile, to explore design of the structure and to assess the significance of archeological deposits within the feature (Figure 6.15). Test Unit 979N/849E was positioned just outside of the south wall near the southwest corner of Feature 2 in an area identified as a possible entryway. Test Unit 981N/852E was positioned within the southeast corner of Feature 2. Test Unit 984N/852E was placed in the northeast corner of Feature 2, partially extending beyond the feature boundaries to the north. These test units ranged in final depths from 19 to 48 cm bgs.

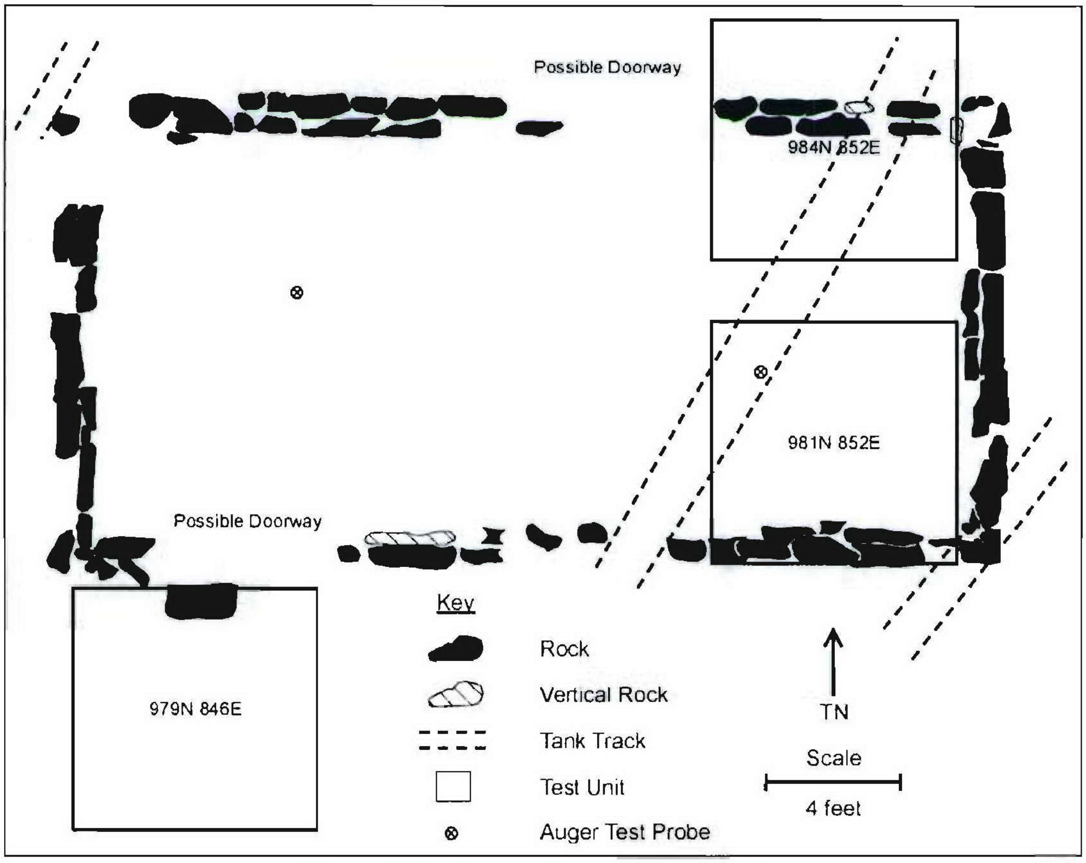


Figure 6.15. Feature 2, test units, Area A.

Test Unit 979N/846E Test Unit 979N/846E was placed just outside of the south wall near the southwest corner of Feature 2 in an area identified as a possible entryway. A sandstone slab, much larger than those incorporated into the walls of the feature, is present at the surface within the northern portion of the test unit. This stone is offset from the alignment of the south wall and is suggestive of a stoop. The surface of the test unit sloped slightly to the south. Control samples were collected from all four corners of the test unit. This test unit was excavated in two layers of four arbitrary levels. These levels ranged in thickness from 0 to 11 cm, to a final depth of 17 to 19 cm bgs.

Layer 1 was excavated in two levels. Due to the slope of the test unit and the underlying stratigraphy, each level extended over approximately half of the test unit, beginning with the north and ending with the south portion of the test unit. This layer consisted of the removal of the sod and loose sediments from the surface. These sediments extended to a maximum thickness of between 5 to 11 cm before a layer change was made. The majority of artifacts recovered from this layer derive from the north half of the unit, closest to the structure. Charcoal was noted at the contact of Layer 1 with the underlying lighter colored and more compact sediments of Layer 2.

Layer 2 was excavated in two levels. Due to the slope of the test unit and the underlying stratigraphy, the final level was excavated as a 1 m x 2 m subdivision in the south half of the unit. Layer 2 displayed a more developed soil structure and higher levels of calcium carbonate. This layer extended to a maximum thickness of between 8 to 14 cm before excavation was terminated. Charcoal was present in the unit fill.

After excavations were terminated, profile drawings were completed of two walls, the north (south-facing) and in the east (west-facing) walls. These strata are illustrated in Figure 6.16 and are described below.

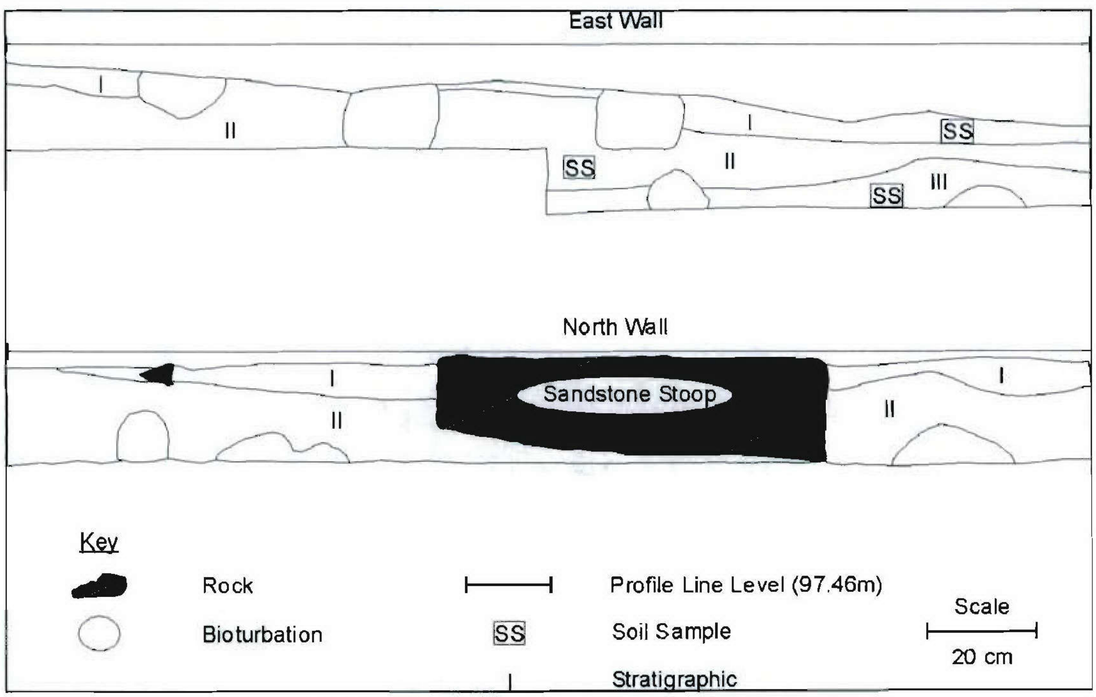


Figure 6.16. 979N/846E, Feature 2, profiles, Area A.

Stratum I — Stratum I is a pinkish gray to brown (7.5 YR 6/2 - 5/2) silt with fine sand. Soil structure is weakly developed and single grain. The stratum is 0 to 8 cm thick. The lower boundary is abrupt and ranges from smooth to wavy. Gravel is minimally present, accounting for up to 2 % of the sediment matrix.

The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

A number of historic artifacts and three flaked-lithic artifacts were recovered from the upper portion of this test unit within a range of 5 to 11 cm from the surface. These artifacts are attributed to Stratum I, although some may have derived from the upper portion of Stratum II. The historic artifacts include a button, a cartridge casing, a few fragments of glass and historic ceramics and numerous metal fragments including two wire nail fragments. A gastropod sample and eggshell were also recovered from $^{1}/_{16}$ inch wet screening.

Stratum II Stratum II is a pinkish gray (7.5 YR 6/2) silt with fine sand. Soil structure is weak to moderately developed and subangular blocky. The stratum is at least 3 to12cm thick. The lower boundary is clear and wavy. Gravel is minimally present, accounting for up to 2 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. A white speckling, presumably calcium carbonate, is visible in this stratum. Disturbance from bioturbation is present.

The majority of artifacts recovered from this test unit derived from within a range of 5 to 19 cm bgs. These artifacts are attributed to Stratum II, although some may have derived from the upper portion of Stratum III. Historic artifacts were predominant, although a few flaked-lithic artifacts and nonhuman bone specimens were collected. The historic artifacts include two buttons, eight cartridge casings, a few fragments of glass, historic ceramics and leather, numerous metal fragments including complete and fragments of wire nails and wire fragments, portions of two tin cans and a door hardware assembly. Wood samples were also collected. A gastropod sample and eggshell were recovered from $^{1}/_{16}$ inch wet screening.

Stratum III Stratum III is a pinkish gray to brown (7.5 YR 6/2 - 5/2) silt with fine sand. Soil structure is weak to moderately developed and angular blocky to platy. The stratum is at least 8 cm thick, but the lower boundary is unidentified. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Stratum III was not identified during excavation but was recognized during profile interpretation. Field notes indicate that artifact frequencies dramatically decreased at the depth of this stratum. Considering the amount of bioturbation encountered, what few artifacts that were encountered were probably displaced from higher stratigraphic contexts. This stratum represents a Bk soil horizon.

Excavation of Test Unit 979N/846E was terminated when it was believed that excavations had continued beyond the level of historic occupation. In the north half of the unit, excavations had continued below the bottom of the sandstone stoop into an area heavily disturbed by bioturbation. In the south half of the unit, artifact frequencies greatly decreased towards the bottom of the final level, coinciding with the upper boundary of Stratum III.

This boundary may reflect the historic occupational surface. In general, the majority of artifacts recovered from this test unit derived from the north half of the unit, adjacent to Feature 2, and especially from the two northern control samples.

Test Unit 981N/852E Test Unit 981N/852E was placed in the southeast corner of Feature 2 (Figure 6.15). The southern quarter of the test unit included a portion of the structure's south wall. Consequently, control samples were collected from the northeast and northwest corners only. ATP 8 was located in the northwest corner of the test unit. This test unit was positioned to expose a portion of the foundation wall, and at the same time to investigate the results of the auger test probe and the presence of a strong magnetic anomaly. The surface of the test unit was relatively flat with a slight dip in the southeast corner. One historic ceramic was recovered from the surface. This test unit was excavated in three layers of four arbitrary levels. These levels ranged in thickness from 3 to 14 cm, to a final depth of between 31 and 32 cm bgs.

Layer 1 was excavated in a single level, which consisted of the sod and loose sediments from the surface. These sediments extended to a maximum thickness of between 4 to 5 cm before a layer change was made. Scattered and overlapping tabular sandstone blocks, no larger than 15 cm, were exposed in this layer and continued into Layer 2.

Layer 2 was excavated in a single level extending to a maximum thickness of between 3 to 6 cm before a layer change was made. Sediments appeared lighter in color than Layer 1 and exhibited a white speckling as well as a soil structure change. The scattered and overlapping tabular sandstone blocks exposed in Layer 1 continued throughout this layer.

Layer 3 was excavated in two levels extending to a maximum thickness of between 20 to 24 cm before excavations were terminated. Sediments appeared lighter than the previous layer and the soil structure changed. The white speckling increased in the first level of Layer 3 but dramatically decreased by Level 2, being confined to isolated and small inclusions. The scattered and overlapping tabular sandstone blocks continued but were substantially less by Level 2. Similarly, cultural remains recovered from Layer 3 were prolific in Level 1 but reduced dramatically by Level 2. Overwhelmingly, the majority of artifacts recovered from Layer 3 were nonhuman faunal remains. The nonhuman faunal remains, along with a wide range of historic artifacts, were scattered across the entire unit with definite areas of concentration occurring primarily in the eastern half of the unit.

Four strata were recognized in the south (north-facing), west (east-facing), and in the east (west-facing) wall profiles. These strata are illustrated in Figure 6.17 and are described below.

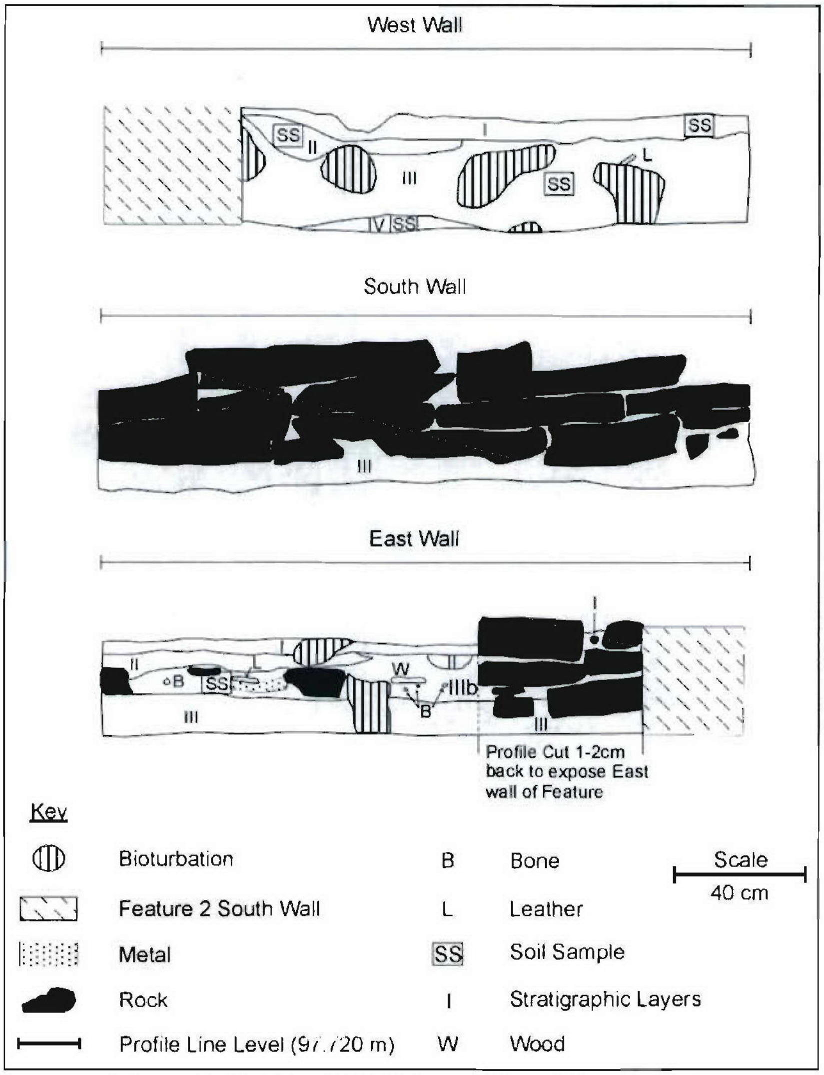


Figure 6.17. 981N852E, Feature 2, profiles, Area A.

Stratum I — Stratum I is a brown (7.5 YR 5/4) silty loam with some fine to medium sand. Soil structure is weakly developed and single grain to blocky. The stratum is 2 to 8 cm thick. The lower boundary is clear to gradual and smooth. Gravel is minimally present, accounting for up to 4 % of the sediment matrix. Gravels are of well-sorted granular size. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

A number of historic artifacts as well as one flake tool, five flaked-lithic artifacts and three nonhuman bone specimens were recovered from Stratum I. The historic artifacts include one button, a few glass fragments and numerous metal fragments including one complete wire nail and several wire fragments. Eggshell was recovered from $^{1}/_{16}$ inch wet

screening

Stratum II Stratum II is pinkish gray (7.5 YR 7/2), medium to course silty sand loam. Soil structure is moderately developed and subangular blocky. The stratum is 0 to 10 cm thick, being present only in portions of the profile. The lower boundary is clear and smooth. Gravel is minimally present, accounting for up to 2 % of the sediment matrix. Gravels are of well-sorted granular size. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Layers of laminae were noted in the west wall profile. Stratum II was not identified during excavation but was recognized during profile interpretation. Given the limited presence of Stratum II across the test unit profile it is unclear whether any cultural remains were recovered from this stratum.

Stratum III Stratum III is a brown (7.5 YR 5/2), fine to medium sandy clay loam. Soil structure is weak to moderately developed and subangular blocky. The stratum is at least 18 cm thick. Where the lower boundary is present in the west wall profile, it is clear and smooth. Gravel is present, accounting for up to 15 % of the sediment matrix. Gravels are of granular to cobble size. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Layers of laminae were noted containing a white speckling. Stratum III was not differentiated from Stratum IIIb during excavation.

Cultural remains identified in the profile include a fragment of leather. It is unclear to what extent cultural remains were present other than what was visible in the profile. Due to the irregularities in stratigraphic boundaries surrounding Strata III and IIIb that were not identified during excavation; therefore, it is difficult to attribute cultural remains to a specific stratum.

Stratum IIIb Stratum IIIb is only identified in the east wall profile. This stratum is a pink (7.5 YR 7/4), fine to medium sandy clay loam. Soil structure is weak to moderately developed and subangular blocky. The stratum is 4 to 14 cm thick. The lower boundary is abrupt and smooth. Gravel is present, accounting for 5 to15 % of the sediment matrix. Gravels are granular to cobble size. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Layers of laminae and cultural remains were noted against the east wall profile. Stratum IIIb was not identified during excavation but was recognized during profile interpretation.

Cultural remains identified in the profile include fragments of bone, leather, metal and wood. It is unclear to what extent cultural remains were present other than what was visible in the profile. It is also unclear how Stratum IIIb continued across the remainder of the test unit. Considering that it was not identified in the west wall profile, it is possible that

this stratum pinched out across the test unit within two meters of the east wall.

The bulk of cultural materials recovered from this test unit can roughly be assigned to Stratum III in general, although some of this material may have derived from portions of Stratum II. The majority of artifacts (ecofacts) recovered were nonhuman faunal remains. The remaining cultural materials recovered includes seven flaked-lithic artifacts and a wide range of historic artifacts. The historic artifacts include two cartridge casings, two buttons, fragments of glass, historic ceramics, leather, plastic, rubber and textile and numerous metal fragments including wire and wire nail fragments as well as numerous fragments of tin cans. Charcoal and wood samples were also collected. One macrobotanical sample and eggshell were recovered from $^{1}/_{16}$ inch wet screening.

Stratum IV — Stratum IV is only identified in the west wall profile. This stratum is a pinkish gray (7.5 YR 6/2), fine to course silty sand loam. Soil structure is moderately developed and angular blocky. The stratum is at least 5 cm thick. The lower boundary is unknown. The sediments display a moderately violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Strata IV was not identified during excavation. It is unclear whether any cultural remains were present in this stratum. Given the rapid decrease in artifact frequencies directly above this stratum, if any cultural remains were present they probably were displaced from higher stratigraphic contexts.

Excavation of Test Unit 981N/852E was terminated when it was believed that excavations had continued beyond the level of historic occupation. The majority of artifacts recovered from this test unit (approximately 80 %) derived from within a range of 8 to 22 cm bgs. Within this range, the greatest frequency was recovered from 20 cm bgs. These artifacts are attributed to both Stratum IIIb and the upper portion of Stratum III, since both strata occur within that range and the distinction between the two was not recognized in the field. Below 22 cm bgs very few cultural remains were recovered (< 5 %). This depth directly coincides with the lower boundary of Stratum IIIb occurring in the east wall profile, suggesting that a depositional surface occurs at this boundary. Additionally, although artifacts were encountered across the entire test unit, the majority of artifacts were noted to be concentrated in the eastern portion of the test unit where Stratum IIIb was identified in profile. It is possible that the bulk of cultural remains recovered from the test unit derived from Stratum IIIb.

Test Unit 984N/852E Test Unit 984N/852E was placed in the northeast corner of Feature 2, partially extending beyond the feature boundaries to the north (Figure 6.15). As a result, a portion of the north wall of Feature 2 runs east/west across the test unit. This test unit was positioned to expose and compare a portion of the foundation wall, both inside and outside of the feature. The surface of the test unit sloped slightly to the east and south. A depression, approximately 55 cm across was present in the southern portion of the unit inside Feature 2. This is probably the result of rodent or animal burrowing. One historic ceramic

was recovered from the surface. Control samples were collected from all four corners of the test unit. This test unit was excavated in three layers of seven arbitrary levels. These levels ranged in thickness from 0 to 13 cm, to a final depth of 27 to 48 cm bgs. Sediments from each side of the feature wall were screened separately, and any artifacts recovered were given separate field specimen numbers to distinguish between inside and outside.

Layer 1 was excavated in two levels. Due to the slope of the test unit and the underlying stratigraphy, each level was only partially excavated across the test unit. This layer consisted of sod and loose sediments from the surface. These sediments extended to a maximum thickness of between 4 to 10.5 cm before a layer change was made. Charcoal was noted throughout this layer. Extending across the outer wall of the feature wall was an area of disturbed sediments containing fragments of milled lumber. It is unclear whether this disturbed area was a result of cultural modifications or bioturbation.

Layer 2 was excavated in four levels. The first two were excavated both inside and outside of the feature, while the lower two levels were excavated outside of Feature 2 only. Sediments appeared to be of the same depositional unit, both inside and outside of Feature 2, being lighter in color than Layer 1 and exhibiting an increase in soil structure. This layer extended to a maximum thickness of 4 to 9 cm inside of Feature 2 before a layer change was made, and 33 to 43 cm outside of the feature before excavation was discontinued. Fragments of milled lumber were observed throughout this layer including larger fragments of wood from inside Feature 2, some of which were partially burned and some were painted a bluish color. The vast majority of these fragments were concentrated adjacent to the feature wall and progressively tapered awa y from the wall.

Layer 3 was excavated in two levels inside Feature 2 only. This layer consisted of sediments exhibiting a slight color change from the previous layer and the presence of a white speckling. Layer 3 extended to a maximum thickness of 15 to 19 cm before excavation was discontinued. Fragments of milled lumber, some of which have been painted a bluish and/or greenish color, continued throughout this layer. Charcoal was also observed throughout this layer. Also recovered during excavation of Layer 3, Level 1 was a possible wild plum seed (*Prunus virginiana*) Numerous, large sandstone blocks up to 40 cm were exposed in the first level of this layer and may represent wall fall. Overall, cultural material decreased by Level 2 of this layer. Excavations discontinued at what was believed to be a historic surface. This surface was characterized by a platy soil structure that released at multiple laminae exposing concentrations of white speckling. This also coincided approximately with the depth of the lowest recovered artifacts from this unit.

A 10 cm deep test trench, measuring 50 x 10 cm was positioned along the west (east facing) wall of the test unit inside Feature 2 and adjacent to the feature wall. This test trench was excavated to extend the profile exposure and to determine if cultural deposits were present below the previous level. No stratigraphic change was identified nor were any cultural remains recovered.

Five strata were recognized in the north (south-facing) and west (east-facing) wall profiles. These strata are illustrated in Figure 6.18 and are described below.

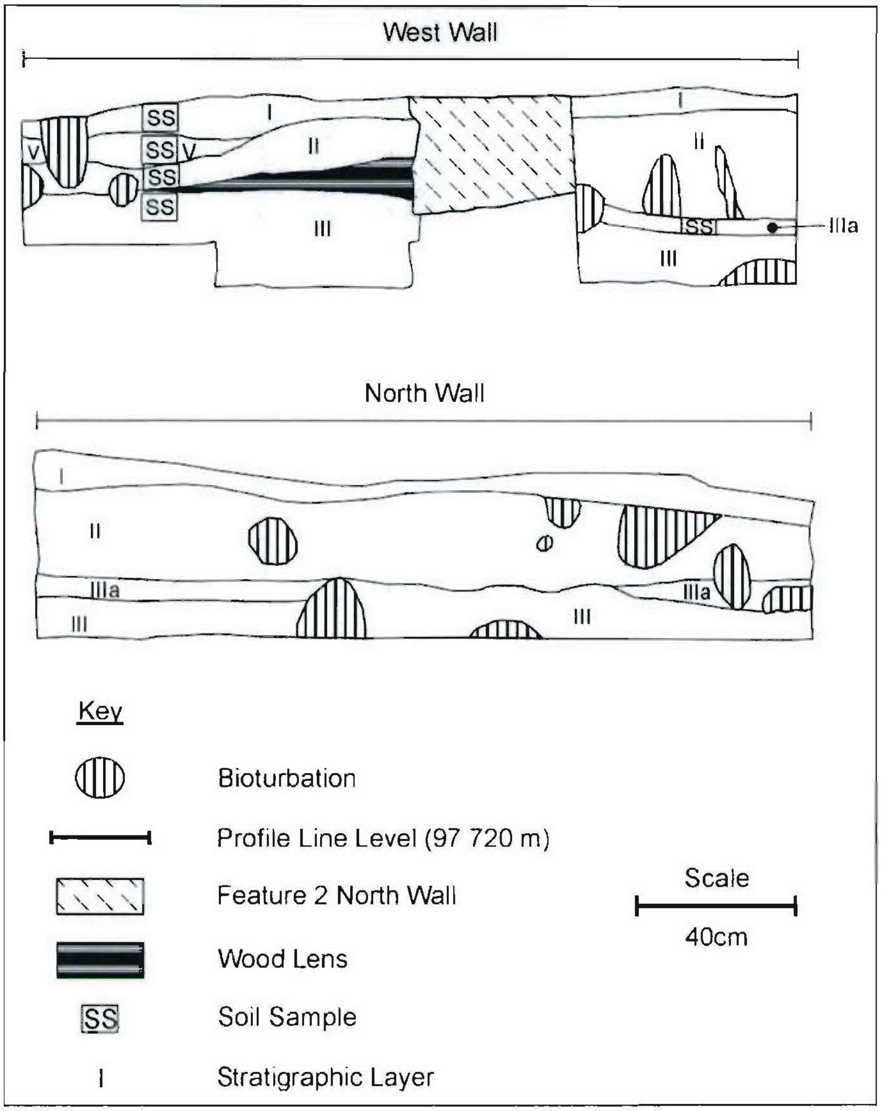


Figure 6.18. 984N/852E, Feature 2, profiles, Area A.

Stratum I — Stratum I is a brown (10 YR 5/3), silty clay loam occurring both inside and outside of Feature 2. Soil structure is weakly developed and single grain to blocky. The stratum is 2 to 10 cm thick. The lower boundary is abrupt to clear and wavy. Gravel is minimally present, accounting for up to 2 % of the sediment matrix. Gravels are of well sorted granule size and predominantly sandstone. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

A number of historic artifacts in addition to five flaked-lithic artifacts and one nonhuman bone were recovered from Stratum I. The historic artifacts include a few fragments of glass and leather and numerous metal fragments including one complete wire nail and several wire nail and wire fragments. A wood sample was also collected. A gastropod sample was recovered from $^{1}/_{16}$ inch wet screening.

Stratum II — Stratum II is a very pale brown (10 YR 7/2) silty clay loam occurring both inside and outside of Feature 2, although substantially thicker outside of the feature. Soil structure is moderately developed and subangular blocky. The stratum is 5 to 26 cm thick. The lower boundary is abrupt to clear and smooth. Gravel was not noted. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

Inside Feature 2, historic artifacts predominate and a single nonhuman bone specimen was recovered. The historic artifacts recovered from inside of Feature 2 include a single piece of leather and numerous fragments of metal including a few wire nail fragments. Outside of Feature 2, historic artifacts were less dominant, and a few flaked-lithic artifacts and nonhuman bone were recovered. One biface was also recovered from the upper portion of Stratum II, outside of Feature 2. The historic artifacts recovered from outside of Feature 2 include a single piece of glass and numerous fragments of metal including wire nail fragments. A wood sample was collected from the upper portion of Stratum II adjacent to the outside wall of Feature 2.

A thin stratigraphic lens (0 to 10 cm) is visible between Strata II and III. This lens is present only inside Feature 2 and consists principally of fragmented milled lumber interdigitated with sediments from both Strata II and III. This lens is thickest at the foundation wall and progressively tapers away from the wall. This lens was not identified during excavation and was not differentiated from either Stratum II or Stratum III. It is unclear whether any cultural remains were present in this lens.

Stratum IIIa — Stratum IIIa is present only outside of Feature 2. This stratum is a pale brown (10 YR 6/3), silty clay loam. Soil structure is weak to moderately developed and subangular blocky. The stratum is 3 to 6 cm thick. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for up to 2 % of the sediment matrix. Gravels are well sorted granules and are predominantly sandstone. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Stratum IIIa was not identified during excavation. It is unclear whether any cultural inclusions were recovered from this stratum and none were identified in profile.

Stratum III — Stratum III is a pale brown (10 YR 6/3), silt clay loam occurring both inside and outside of Feature 2. Soil structure is moderately developed and subangular blocky. The lower boundary remains concealed, but the exposed

stratum is up to 25 cm thick. Gravel is minimally present, accounting for up to 2 % of the sediment matrix. Gravels are well-sorted granules and are predominantly sandstone. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

Inside of Feature 2, historic artifacts predominate, closely followed by frequencies of nonhuman bone specimens. A few flaked-lithic artifacts were recovered and a wood sample and excrement sample were collected. The historic artifacts recovered from inside of Feature 2 include a single button, a cartridge casing, a comb, a few fragments of glass, historic ceramics, leather, plastic, textile and numerous fragments of metal including wire nail fragments. A macrobotanical sample was recovered from $^1/_{16}$ inch wet screening. Outside of Feature 2, artifact frequencies as a whole decreased. Historic artifacts include a few pieces of glass, historic ceramics and a few fragments of metal including wire nail fragments. A few flaked-lithic artifacts and nonhuman bone specimens were also collected.

Stratum V — Stratum V is present only inside of Feature 2. This stratum is a pale brown (10 YR 6/3), silty clay loam. Soil structure is weak to moderately developed and subangular blocky. The stratum is 0 to 8 cm thick. The lower boundary is abrupt and smooth. Gravel was not identified. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Stratum V was not identified during excavation. It is unclear whether any cultural inclusions were recovered from this stratum and none were identified in profile. This stratum may coincide with Stratum II identified in Test Unit 981N/852E.

Excavation of Test Unit 984N/852E was terminated when it was believed that excavations had reached or continued beyond the level of historic occupation. Inside of Feature 2, excavations were discontinued slightly below what was believed to be the historic depositional surface. This surface was characterized by a platy soil structure that released at multiple laminae exposing concentrations of white speckling. This also coincided approximately with the depth of the lowest recovered artifacts from this unit. The subsequently excavated test trench failed to produce any additional artifacts or a stratigraphic change.

Outside of Feature 2, excavations were discontinued at what were considered the sterile sediments of Stratum III. The final level excavated in this portion of the unit recovered a mixture of historic and prehistoric artifacts, but these were mostly confined to the uppermost portion of the level. By the end of the level, all historic cultural remains had ceased. Given the level of disturbance from bioturbation, it is felt that these historic artifacts were disturbed from higher stratigraphic contexts and that the transition from Stratum IIIa and Stratum III represents the historic depositional surface. This transition identified outside of Feature 2 approximately coincides with the level of the upper stratigraphic boundary of Stratum III and the proposed historic depositional surface within Feature 2 as well as with the lower boundaries of the structural wall of Feature 2. For general purposes of

interpretation, the upper boundary of Stratum III, as identified in Test Unit 984N/852E, is considered the level of historic occupation and deposition.

Feature 2 Summary The combined excavations of the three test units (979N846E, 981N/852E, and 984N/852E) within or adjacent to Feature 2 support the original interpretation of this feature as a historic domicile. The foundation wall was exposed in two of the test units (981N/852E and 984N/852E). Test Unit 981N/852E exposed an interior portion of the south wall. Test Unit 984N/852E exposed both interior and exterior portions of the north wall. These exposures revealed a dry laid, tabular sandstone masonry wall, irregularly stacked and at least four courses high. The stones utilized in construction of the foundation, although not intentionally shaped, appear to have been intentionally selected for their original blocky and rectangular shape. The results of these test units suggest that the foundation was constructed on the original ground surface exposed at the time of historic occupation. The historic occupational surface identified in Test Unit 984N/852E, both inside and outside of the feature, is represented by the upper boundary of Stratum III and coincides with the lower boundary of the foundation wall exposed within this test unit. Furthermore, the historic occupational surface identified in Test Unit 981N/852E also coincides with the lower boundary of the foundation wall and the upper boundary of Stratum III exposed in the east wall of this test unit. The upper boundary of Stratum III, identified in Test Unit 979N/846E, occurs at a similar depth and coincides with a dramatic decrease in recovered cultural remains. This boundary may represent a continuation of the historic occupational surface outside of the boundaries of Feature 2. The upper boundary of Stratum III, identified in each test unit, differs in depth by less than 10 cm, suggesting that the historic occupational surface was relatively flat and similar to the topography observed at present.

Cultural remains were recovered throughout excavations, but were concentrated at (or slightly above) the level of historic occupation identified for each test unit (Table 6.3). This concentration of cultural remains is interpreted as being deposited during the occupation of Feature 2 followed immediately by post-occupational deposition. The artifact assemblage recovered from these test units is predominantly historic, although a few prehistoric artifacts were also recovered. The observance of prehistoric and historic remains in the same context probably reflects historic and modern disturbances resulting in mixing of these contexts.

The prehistoric artifact assemblage is composed of a single biface, a flake tool and 39 flaked-lithic artifacts. The historic artifact assemblage is composed of a wide range of artifact classes including buttons, cartridge casings, historic ceramics, glass, leather, plastic, rubber, textile and a diversity of metal items. These metal items include complete and fragmentary wire nails, as well as fragments of wire and tin cans. Additional items recovered from this feature include a plastic comb, fragments of a utensil, a cabinet latch and two cast iron legs that were probably associated with a stove. These artifact classes are representative of particular functional categories associated with a variety of activities.

Table 6.3. Cultural materials recovered from Feature 2, Area A.

Provenience				Materials Recovered ¼"						¹⁄₁₆"					
Test Unit	Layer	Level	Thickness	Biface	Flake Tool	Lithic Debitage	Nonhuman Bone	Gen. Historic	Metal (g)*	Lithic Debitage	Nonhuman Bone	Shell	Gen. Historic	Metal (g)*	Total
	1	1	0 - .11m			1		2		2			1	1.8	6
979N/846E	1	2	0 - .07m									1	3	4.7	4
	2	1	0 - .10m			3	1	8	77.4			8	16	47.8	36
979N/846E S ½	2	2	.10m				4	1	53.3	1				4.1	6
			Total			4	5	11	130.7	3		9	20	58.4	52
	Surface		0m					1							1
981N/852E	1	1	.04 - .05m		1	4	1	4	16.5	1	2	3		6.7	16
	2	1	.03 - .06m				21	8	44.8				1	2.8	30
	3	1	.10 - .14m			2	518	42	230.3	1	35		8	35.7	606
	3	2	.10m			3	16	3	5.8	1				45.3	23
			Total		1	9	556	58	297.4	3	37	3	9	90.5	676
	Surface		0m					1							1
	1	1	0 - .065m						3.5	1	1				2
	1	2	.04m			2			17.2				5	1.1	7
984N/852E	2	1	0 - .04m					1	11.6						1
Inside	2	2	.04 - .09m				1	1	307.6		2			1	4
	3	1	.06 - .10m			2	28	33	27.8				2	3.4	65
	3	2	.06 - .09m			2	2	3							7
	Test Trench		.10m												0
	1	1	0 - .05m			2			2.1					.9	2
	1	2	0 - .02m												0
984N/852E	2	1	.10 - .11m	1					.5						1
Outside	2	2	.10 - .11m						.6						0
	2	3	.09 - .11m			5	3			2			1	7.6	11
	2	4	.11 - .13m			2	1	12	1.6	2	1			.3	18
			Total	1		15	35	51	372.5	5	4		8	14.3	119
			Total	1	1	28	596	120	800.6	11	41	12	37	163.2	847

* This category is composed of mostly highly fragmented and corroded ferrous materials, either representing the remains of tin cans, wire nails, barbed and non-barbed wire or simply unidentifiable metal remains. The unit of measurement is in grams and not included in the test unit totals.

These functional categories are represented by items associated with subsistence and domestic activities, as well as construction materials associated with the superstructure of Feature 2. For example, a significant proportion of cultural material recovered from this feature includes nonhuman faunal remains. Faunal analysis (see Appendix VI) of these specimens indicate that they belong primarily to the subfamily *Caprinae*, but also include *Bovinae*, which most likely corresponds respectively to the genus *Ovis aries* (sheep) and *Bos taurus* (cow). The sheer quantity of faunal remains recovered from Feature 2 (n = 637) suggest that they constituted a significant portion of the occupant's livelihood and/or diet. Other subsistence related items, although much less common than the faunal remains, include fragments of food containers and related items such as tin cans, historic ceramics and

glass. A few fragments of eggshell were also recovered along with a part of a gourd. Personal items related to domestic activities include buttons, cartridge casings and a comb. Construction material associated with the superstructure of Feature 2 include wire nails, window glass and fragments of wood, including milled lumber.

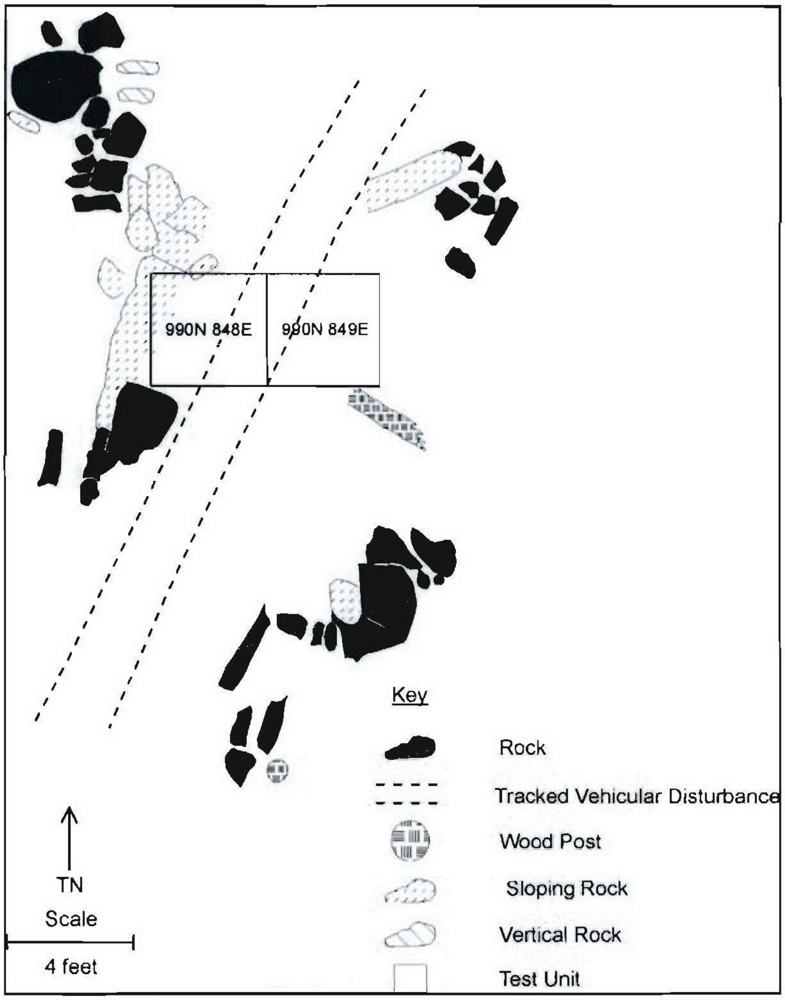


Figure 6.19. Feature 3, test units, Area A.

Feature 3 Excavations Two contiguous 1 m x 1 m test units (990N/848E and 990N/849E) were placed within Feature 3, the dugout (Figure 6.19). Test Unit 990N/849E is near the center of the feature, while Test Unit 990N/848E is next to the features western edge. These test units were excavated to assess the significance of archeological deposits within the feature and to document the extent of damage caused by tactical maneuvers. These units ranged in depth from 37 to 107 cm bgs.

Test Unit 990N/848E Test Unit 990N/848E was excavated prior to Test Unit 990N/849E. The surface of this test unit sloped to the east. A large sandstone slab, believed to be part

of the wall of the feature, occupied the western quarter of the test unit. The westernmost 20 to 25 cm of the test unit was unexcavated to prevent undercutting of this large slab. The control unit was placed in the southeast corner. The test unit was excavated in three layers of four arbitrary levels. These levels ranged in thickness from 0 to 10 cm, to a final depth of 20 to 35 cm bgs.

Layer 1 was excavated in two levels. Due to the slope of the test unit, the first level was only partially excavated across the test unit. This layer consisted of the sod and loose surface sediments extending to a maximum thickness of 6 to 18 cm before a layer change was made. Isolated areas of moderate compaction from vehicular disturbance were noted. Small amounts of charcoal were noted but not collected.

Layer 2 was excavated in a single level extending to a maximum thickness of between 6 to 10 cm before a layer change was made. Sediments are characterized by a slight color and soil structure change as well as an increase in calcium carbonate. Two large sandstone slabs and a piece of wire were exposed in the southern portion of the unit and continued into the next layer. Small amounts of charcoal were observed but not collected.

Layer 3 was excavated in a single level extending to a maximum thickness of between 8 to 10 cm before excavations were terminated. Sediments are characterized by a slight color and soil structure change as well as an increase in calcium carbonate. The sandstone slabs exposed in the previous layer continued throughout Layer 3. These stones were at an angle similar to that of the large sandstone slab exposed at the surface of the test unit and continue below the final level of excavation. Additional sandstone slabs were exposed in this layer within the eastern and central portion of the test unit. These stones probably represent slumped foundation and wall fall of Feature 3.

Excavation of Test Unit 990N/848E was terminated to open up the adjacent Test Unit 990N/849E to the east. This was due to a substantial proportion of the test unit becoming occupied with large sandstone slabs making continued excavations difficult. Three strata were identified in Test Unit 990N/848E and these will be described with the discussion of Test Unit 990N/849E.

Test Unit 990N/849E The surface of this test unit sloped slightly towards its center and to the north. The control unit was placed in the southeast corner of the test unit. The test unit was dug in 5 layers of 12 arbitrary levels. These levels ranged in thickness from between 1 and 11 cm, to a final depth of between 100 and 107 cm bgs.

Layer 1 was excavated in two levels. This layer consisted of the sod and loose surface sediments extending to a maximum thickness of between 4 and 11 cm before a layer change was made. Bioturbation became more evident towards the lower boundary of this layer as the sediments exhibited increased soil structure. Isolated areas of moderate compaction from vehicular disturbance were noted along the western edge and southeast corner of the test unit.

Layer 2 was excavated in a single level extending to a maximum thickness of between 5 and 10 cm before a layer change was made. Sediments in Layer 2 were characterized by a slight color and soil structure change from the previous layer. Isolated areas of moderate compaction from vehicular disturbance were noted along the western and eastern edge of the test unit but seem to dissipate by the lower boundary of this layer. Barbed wire was exposed at the lower boundary of this layer.

Layer 3 was excavated in a single level extending to a maximum thickness of between 7 ando 10 cm before a layer change was made. Sediments in Layer 3 were characterized by a slight color and soil structure change from the previous layer. The presence of barbed wire was more prevalent than the previous layer.

Layer 4 was excavated in three levels extending to a maximum thickness of between 29 and 30 cm before a layer change was made. Sediments in Layer 4 were characterized by a slight color and soil structure change from the previous layer. The soil structure for this layer continued to increase in development with depth. The upper 10 cm of Layer 4 saw a dramatic increase in historic artifacts consisting primarily of barbed wire, although fragments of glass, historic ceramics and miscellaneous metal were also fairly abundant. These cultural remains were recovered from across the test unit but a substantial concentration was noted in the north half. In the following 20 cm, only a few artifacts were recovered. A wood sample was collected from the middle portion of the layer and a small amount of charcoal and milled lumber was observed towards the bottom of Layer 4 in the west half of the unit. A large sandstone slab was also exposed towards the bottom of Layer 4 in the southern portion of the test unit.

Layer 5 was excavated in five levels extending to a maximum thickness of between 49 to 50 cm before excavations were discontinued. Sediments in Layer 5 were characterized by a slight color and soil structure change from the previous layer. The soil structure for this layer began as less well developed than the previous layer and only slightly increased in structural development with depth. An increase in sand and moisture content was noted with depth. Caliche and gypsum were heavy in the final 10 cm of excavations. More sandstone slabs were exposed in this layer and increased with depth until much of the test unit, except for the southeast corner, was covered. These stones probably represent wall fall. The majority of the sandstone slabs were removed to continue excavations and were not encountered during the final 10 cm of excavations. Small amounts of wood and milled lumber were observed in the upper 20 cm of this layer, while small amounts of charcoal were observed through the entirety of the layer. None of the charcoal, milled lumber or wood were collected.

Nine strata were recognized between the north (south-facing), south (north-facing) and east (west-facing) wall profiles, including the three strata recognized in the adjacent Test Unit 990N/848E. These strata are illustrated in Figure 6.20 and are described below.

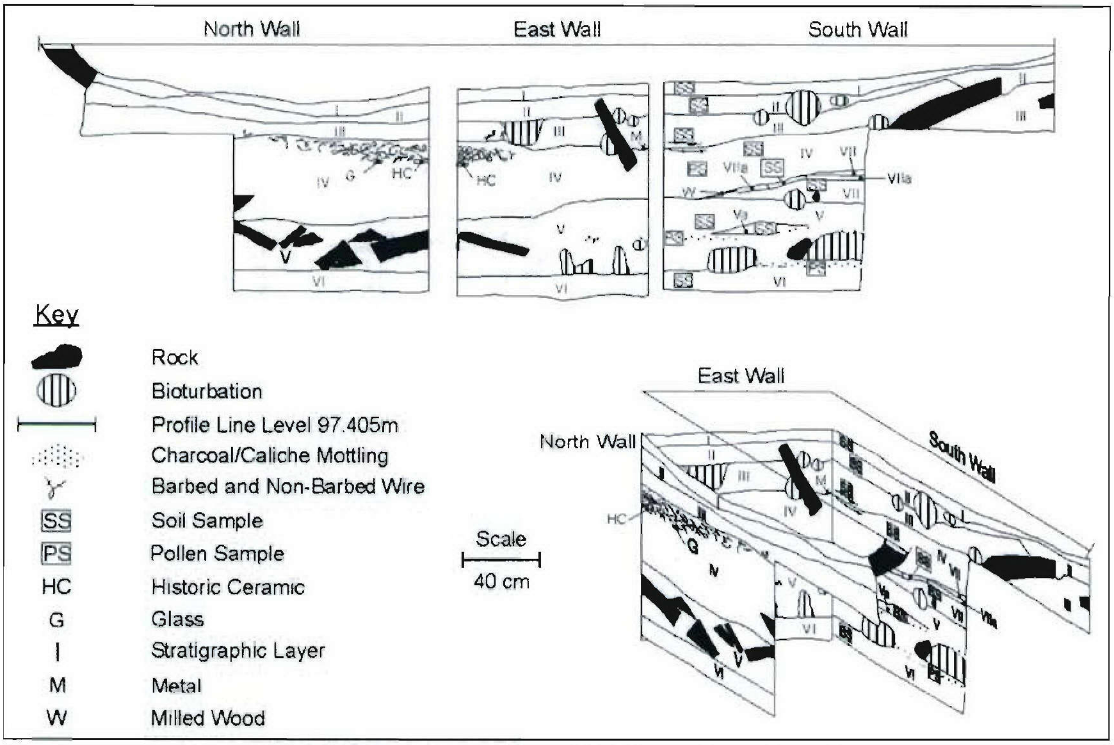


Figure 6.20. Feature 3, profile illustrations, Area A.

Stratum I — Stratum I is a pale brown (10 YR 6/3), silt with sand occurring in both test units. Soil structure is single grain. The stratum is 1 to 8 cm thick. The lower boundary is clear and smooth to slightly wavy. Gravel is minimally present, accounting for less than 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

Stratum II — Stratum II is a pale brown to brown (10 YR 6/3 to 5/3), silt loam occurring in both test units. Soil structure is weakly developed and subangular blocky. The stratum is 2 to 13 cm thick. The lower boundary is clear and smooth. Gravel is minimally present, accounting for up to 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

Stratum III — Stratum III is a pale brown (10 YR 6/3), silt loam occurring in both test units. Soil structure is moderately developed and angular blocky. The stratum is 6 to 25 cm thick. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for up to 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

Strata I through III represent post-occupational episodes of deposition and disturbance of Feature 3. Historic artifacts predominate, increasing with depth. Similar classes of historic artifacts were recovered from the first three strata of both test units excavated in Feature 3, although Test Unit 990N/849E produced greater quantities. These artifacts include a few fragments of historic ceramics and glass and numerous fragments of metal including fragments of wire and wire nails. By Stratum III, there was an increase in the quantity of artifacts recovered including all of those described above, but also a single fragment of rubber and two flaked-lithic artifacts were recovered and a gastropod sample was collected from $^1/_{16}$ inch wet screening.

Stratum IV — Stratum IV is exposed only in Test Unit 990N/849E. This is a brown (10 YR 5/3), silt loam with slightly more clay noted than in the previous stratum. Soil structure is well developed and angular blocky. The stratum is 25 to 44 cm thick. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for up to 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present.

Stratum V — Stratum V is a very pale brown to pale brown (10 YR 7/3 to 6/3), silt loam exposed only in Test Unit 990N/849E. Soil structure is weakly developed and subangular to angular blocky. The stratum is 23 to 37 cm thick. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for less than 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Distinct laminae are visible throughout this stratum. Sporadic lenses of charcoal and calcium carbonate mottling are present.

Stratum Va — Stratum Va is a light yellowish brown (10 YR 6/4), silt loam exposed only in the south wall profile of Test Unit 990N/849E. This stratum is a lens within Stratum V, approximately 55 cm in length and pinching out at either end. Soil structure is weakly developed and angular blocky. The stratum has a maximum thickness of 6 cm. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for less than 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. This lens is roughly at the same depth as the charcoal and calcium carbonate mottling identified in Stratum V.

Stratum IV and Stratum V represent the historic occupational episode of deposition and disturbance of Feature 3. The lower boundary of Stratum V represents the floor of Feature 3 and the beginning of cultural deposition, while the upper boundary of Stratum IV represents the final period of cultural deposition followed by the natural deposition of Strata III through I. Similar to the first three strata, historic artifacts predominate in Strata IV and V, but occur at a much higher level of frequency and include a greater diversity of artifact classes. Artifact frequencies were not consistent throughout these strata. Consisting primarily

of historic artifacts, the first artifact concentration was restricted to the upper 20 cm portion of Stratum IV and tapered off to virtually none at the transition between Strata IV and V. This concentration included numerous fragments of glass and historic ceramics, an abundance of metal fragments including wire and wire nail fragments, as well as numerous fragments of tin cans. A single flaked-lithic artifact was recovered and a wood sample was collected. Eggshell was recovered from $^1/_{16}$ inch wet screening. For the following 20 cm, as Stratum IV transitioned into Stratum V, a single piece of glass and a few fragments of metal were recovered. Eggshell was also recovered from $^1/_{16}$ inch wet screening. A second artifact concentration was observed about midway through Stratum V and continued until that stratum's lower boundary. Although not quite as profuse as the first artifact concentration, this concentration included one historic ceramic, a few fragments of leather along with the tattered remains of a pair of leather boots, and numerous fragments of metal including wire and wire nail fragments. One flaked-lithic artifact and numerous nonhuman bone specimens were also recovered.

A pollen sample was submitted for analysis from Stratum V. The reasoning for submitting this sample was to identify taxa that might indicate the climate at the time of occupation and hopefully provide some insight into economic activities participted in by the site's residents. The pollen count was extended to 400+ grains in an effort to identify additional plant taxa than represented in smaller samples. Taxa represented are fully described in Appendix V. Basically the assemblage is dominated by durable and over-represented pollen grains from low spine Asteraceae, Cheno-Ams, Poaceae, *Juniperus* and *Pinus*. Additional herbaceous taxa identified include *Artemisia*, high sping Asteraceae, Cyperaceae, *Eriogonum*, Fabaceae, *Platyopuntia*, Polygonaceae, *Typha* and *Yucca*, while arboreal taxa are represented by *Picea*, *Quercus*, and *Salix*. Unfortunately, these taxa are represented in the area at present and probably reflect natural rather than cultural occurrences (Appendix V).

Stratum VI — Stratum VI is a brownish yellow (10 YR 6/6), silt loam exposed only in Test Unit 990N/849E. Soil structure is weakly developed angular blocky. The lower boundary is unknown, but the stratum is exposed up to 13 cm in thickness. Gravel is minimally present, accounting for less than 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Concentrations of calcium carbonate and gypsum are noted throughout this stratum. No artifacts were recovered from this stratum.

Stratum VII — Stratum VII is a light yellowish brown (10 YR 6/4), silt loam exposed only in the south wall profile of Test Unit 990N/849E. This stratum lies between Stratum IV and Stratum V. Soil structure is weakly developed and single grain. The stratum is 0 to 16 cm thick, which includes the thin lens of Stratum VIIa that bisects the upper portion of this stratum. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for less than 1 % of the sediment matrix. The sediments display a violent

reaction to hydrochloric acid. Disturbance from bioturbation is present. Small amounts of calcium carbonate are noted in this stratum. Stratum VII was not identified during excavation. Due to the irregularity of stratigraphic boundaries it is unclear whether cultural remains were present in this stratum or if they derived from Stratum IV and/or Stratum VIIa.

Stratum VIIa Stratum VIIa is a very pale brown (10 YR 8/4 to 7/4), silt lens exposed only in the south wall profile of Test Unit 990N/849E. This stratum underlays Stratum IV and bisects the upper portion of Stratum VII. Soil structure is moderately developed and angular blocky. The stratum is 0 to 12 cm thick. The lower boundary is abrupt and smooth. Gravel is minimally present, accounting for less than 1 % of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Stratum VIIa was not identified during excavation. Due to the irregularity of stratigraphic boundaries, it is unclear whether cultural remains were present in this stratum or if they derived from Stratum IV and/or Stratum VII.

A series of soil samples from Strata I - VI was submitted for soil textural (hydrometer) analysis (Appendix IV). These samples range from a silt loam to a clay loam. The silt loam occurs in Stratum I, where recent eolian sediment have probably supplied a good portion of the total stratum matrix. Strata IV and V, the occupation strata, are clay loams. This is not surprising since these sediments probably reflect the initial infilling of the depression, concomitant with and immediately after occupation. The fine-grained nature of these strata probably represent a time when the structure was intact and beginning to deteriorate and the fine alluvial sediments found their way into the depression through overland flow and possibly from deterioration of a sod roof. Possibly the water and sediments collected in the depression and pooled in the lowest parts of the feature. The fine-grained sediments settling out over time.

Excavation of Test Unit 990N/849E was terminated when it was believed that excavations had continued beyond the level of historic occupation. All cultural remains including the historic and prehistoric artifacts, the charcoal mottling and the sandstone slabs discontinued abruptly at the transition of Strata V and VI, where Stratum VI is devoid of any cultural material. This culturally sterile stratum was encountered across the entirety of the test unit.

Feature 3 Summary The combined excavations of the two test units (990N/848E and 990N/849E) within Feature 3 support the original interpretation of this feature as a historic dugout. The construction method of this feature was not clearly defined through excavations. It is clear, however, that the walls of the feature were constructed of sandstone slabs. This is based on the amount of wall fall exposed throughout excavations. These slabs ranged in size from cobble to boulder, with those exposed at or near the surface being of significant proportion. Many of the stones appeared unprepared and irregular in shape. This contrasts with the shape of the stones found in association with Feature 2, the domicile,

which although not necessarily prepared, appear to have been selected for their blocky and rectangular shape. The floor of the feature was identified approximately 95 to 107 cm bgs, attesting to its overall depth.

Table 6.4. Cultural materials recovered from Feature 3, Area A.

Provenience				Materials Recovered								
				1/4"				1/16"				
Test Unit	Layer	Level	Thickness	Lithic Debitage	Nonhuman Bone	Gen. Historic	Metal (g)*	Nonhuman Bone	Shell	Gen. Historic	Metal (g)*	Total
990N/848E	1	1	0 - 10 cm			1	4.7					1
	1	2	6 - 9 cm								3.9	-
	2	1	6 - 10 cm								.6	-
	3	1	8 - 10 cm	1		2	8.7			1	7.8	4
			Total	1		3	13.4			1	12.3	5
990N/849E	1	1	3 - 10 cm			1	27.1				2.3	1
	1	2	1 - 3 cm				30.1				1.6	-
	2	1	5 - 10 cm			1	100.9				1.7	1
	3	1	7 - 10 cm			2	460.7				14.2	2
	4	1	9 - 11 cm	1		60	2178.7			1	527.1	62
	4	2	8 - 10 cm			30	603.4		1	3	298.1	34
	4	3	10 - 11 cm			1			1		6.1	2
	5	1	9 - 10 cm								.5	-
	5	2	9 - 10 cm	1		13	13.9	2		2	1.1	18
	5	3	10 cm		55	2	19.5					57
	5	4	10 cm		326	1	58.4					327
	5	5	10 cm									-
			Total	2	381	111	3492.7	2	2	6	852.7	504
			Total	3	381	114	3506.1	2	2	7	865	509

* This category is composed of mostly highly fragmented and corroded ferrous materials, either representing the remains of tin cans, wire nails, barbed and non-barbed wire or simply unidentifiable metal remains. The unit of measurement is in grams and not included in the test unit totals.

The artifact assemblage recovered from these test units is predominantly historic, although a few prehistoric artifacts were also recovered (Table 6.4). The presence of prehistoric and historic remains in the same context probably reflects historic and modern disturbances, resulting in mixing of these artifacts. The prehistoric artifact assemblage is composed of three flakes. The historic artifact assemblage is composed of a wide range of artifact classes including nonhuman faunal remains, historic ceramics, glass, leather, rubber and a diversity of metal items. These metal items include fragments of wire nails, wire (much of which is barbed) and tin cans. Additional items recovered from this feature include a glass bottle stopper from Stratum IV and a pair of leather boots from Stratum V.

An interpretation of the life history of this feature begins with its use as a dugout, probably for storage of personal and food items. At some point, the walls of the structure collapsed inward, whether intentionally or not is unclear. The pattern of stone debris

observed throughout excavations indicate that the feature was already experiencing sediment deposition prior to the collapse of the structures walls. This is evidenced by the sloping nature of the wall fall, where only those stones in the central portion of the feature rest on or near the floor surface. Closer to the edges of the feature, the stones begin to arc upwards. Although projecting this arc to connect with the stones exposed on the surface requires interpolating their trajectory through the unexcavated portion of the feature, the angle of the periphery stones suggest such a trajectory. Continued deposition and filling of the feature occurred subsequent to collapse of the feature walls. The presence of the two artifact concentrations identified in Stratum IV and Stratum V suggest that these strata were deposited while the site was still occupied. Although still containing cultural material, subsequent deposition of Strata I through III is interpreted as post-occupational.

The first concentration of historic artifacts was identified within the initial 20 cm of Stratum IV. Historic artifacts associated with this concentration include 57 fragments of historic ceramics, 39 pieces of glass and an enormous quantity of wire fragments, most of which were barbed. The second concentration of historic artifacts was identified within the final 20 cm of Stratum V. Historic artifacts associated with this concentration include a single fragment of historic ceramic, 14 pieces of leather and approximately 60 fragments of metal including fragments of wire and wire nails. At or very near the floor of the feature, a concentration of nonhuman faunal specimens was exposed. Faunal analysis of these specimens indicate that they represent the nearly complete skeleton of a juvenile sheep, minus the cranium. Wall fall covered the majority of these faunal remains, suggesting that they lay on the floor of the feature prior to its collapse. Slightly higher within the feature fill of Stratum V, approximately 10 to 15 cm above the floor, a pair of leather boots was recovered. The only other fragments of leather recovered from this feature derived from similar elevations, and were probably associated with the pair of boots.

The depositional history of Feature 3 is interpreted as representing occupational and post-occupational trash fill. The artifact classes recovered from the feature are representative of particular functional categories attributable to activities associated with the historic component of Area A as a whole. These functional categories are represented by items associated with subsistence and domestic activities, as well as construction materials associated with animal husbandry. For example, a significant proportion of cultural material recovered from this feature includes the large quantity of wire and barbed wire associated with the fencing of livestock. Subsistence and domestic items are represented by fragments of eggshell, historic ceramics, glass, tin cans and a pair of boots. A few items related to building materials were also present, such as wire nail fragments.

Geophysical Anomaly Testing

A few geophysical anomalies were identified from the remote sensing surveys and two of these were selected for testing. A 2 m x 2 m test unit (981N/878E) was positioned over a resistance anomaly and a second 2 m x 2 m test unit (1031.5N/876.5E) was positioned over a magnetic anomaly (Figure 6.2, Figure 6.13, Figure 6.14). Results for these test units are summarized below.

Test Unit 981N/878E Test Unit 981N/878E was positioned to investigate the nature of a low resistant geophysical anomaly recognized in the resistivity survey data (Figure 6.13). Its location in respect to Feature 1 and Feature 2, and the intensity of its anomalous expression warranted testing. This test unit was excavated in two layers of four arbitrary levels. The final level was dug as a 1 m x 2 m subdivision in the west half of the test unit. These levels ranged in thickness from 5 to 10 cm, to a final depth of 35 to 40 cm bgs. Control samples were collected from all four corners of the test unit.

Layer I was excavated in a single level. This layer consisted of the sod and loose sediments extending to a maximum thickness of 5 to 10 cm before a layer change was made. The sediments in the eastern portion of the test unit were considerably more loose and disturbed than in the remainder of the test unit. This is the result of bioturbation from burrowing activities.

Layer 2 was excavated in three levels. This layer extended to a maximum thickness of 30 cm before excavation was terminated. The sediments were characterized by a color and structural change from the previous layer. Disturbance from bioturbation was encountered throughout this layer and increased significantly with depth. The presence of gypsum was noted in the final level.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These strata are illustrated in Figure 6.21 and are described below.

Stratum I — Stratum I is a pale brown (10 YR 6/3), silt loam with fine sand. Soil structure is single grain to weakly developed and subangular blocky. The stratum is 2 to 4 cm thick. The lower boundary is clear and smooth. Gravel is not present. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Lithic debitage was identified at the surface of this test unit. A gastropod sample was recovered from $^{1}/_{16}$ inch wet screening.

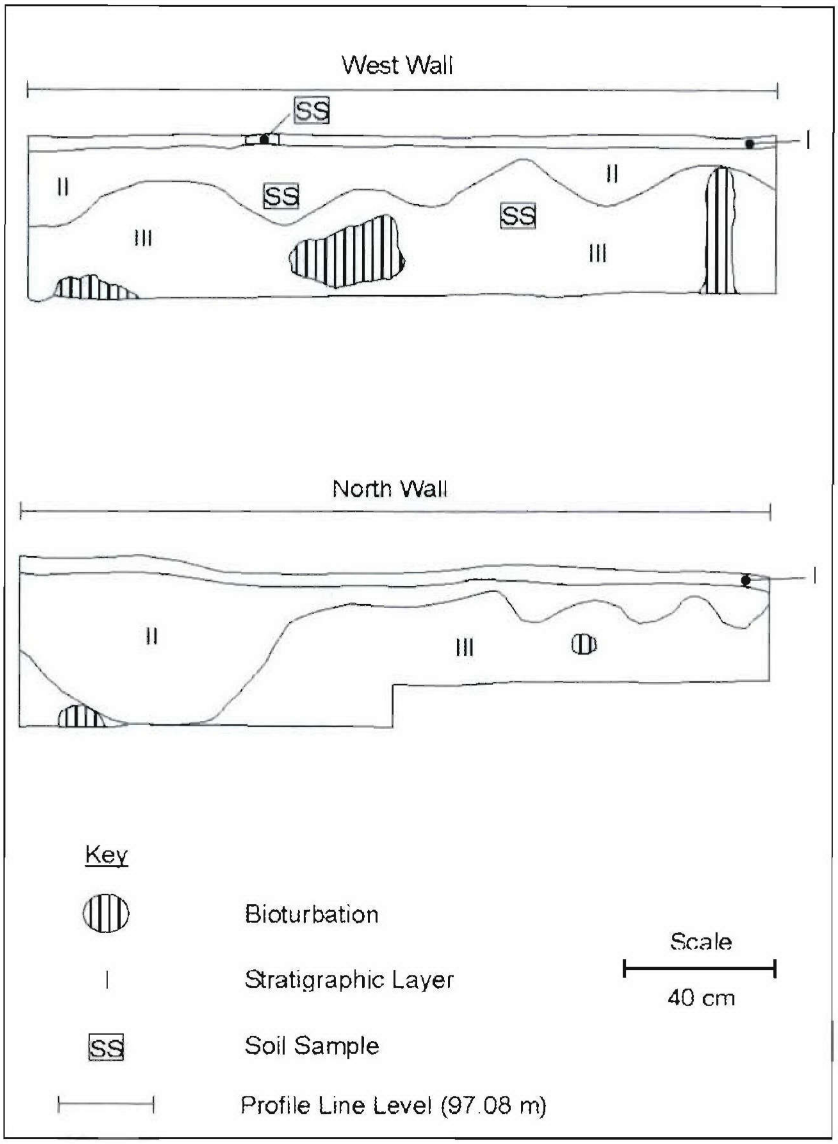


Figure 6.21. 981N/878E, profiles, Area A.

Stratum II

Stratum II is a light brownish gray (10 YR 6/2), silty clay loam with fine sand. Soil structure is single grain to moderately developed and subangular blocky. The stratum is 3 to 40 cm thick. The lower boundary is abrupt and wavy. Gravel is minimally present, accounting for up to 1 % of the sediment matrix. Gravels are of pebble size. There is a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. A few flaked-lithic artifacts were recovered from this stratum. A gastropod sample was recovered from $^{1}/_{16}$ inch wet screening.

Stratum III Stratum III is a very pale brown (10 YR 6/2), silty loam with fine sand. Soil structure is single grain to moderately developed and subangular blocky. The stratum is at least 36 cm thick. The lower boundary remains concealed. Gravel is minimally present, accounting for up to 1 % of the sediment matrix. Gravels are of pebble size. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Stratum III was not identified during excavation. Due to the irregularity of stratigraphic boundaries, it is unclear whether cultural remains were present in this stratum or if they derived from Stratum II.

Excavation of Test Unit 981N/878E was terminated because cultural remains were no longer encountered and the resistance anomaly being investigated was believed to have been identified. The resistance anomaly appears to be the result of extensive bioturbation from burrowing animals. The majority of artifacts recovered from this test unit derived from the upper 10 cm range (Table 6.5). This includes all of Stratum I and the uppermost portion of Stratum II. The remainder of excavations in this test unit produced few artifacts. Considering the amount of bioturbation encountered throughout the test unit, it is probable that artifacts recovered at lower depths were displaced from higher stratigraphic contexts.

Table 6.5. Cultural materials recovered fromTest Unit 981N/878E, Area A.

Provenience				1/4"		1/16"	
Test Unit	Layer	Level	Thickness	Lithic Debitage	Shell	Lithic Debitage	Total
	1	1	5 - 10 cm	6	1	1	8
981N/878E	2	1	10 cm	2		1	3
	2	2	10 cm	1		1	2
981N/878E W ½	2	3	10 cm				-
			Total	9	1	3	13

A soil sample was submitted for hydrometer (textural) analysis and measures. The texture of this sample from Stratum III is a silt loam, with very little clay. The resistivity reading in Ohm/cm is 342. This is a low reading especially as compared to three other reading from Area C that were considered to be more typical of the resistivity readings of the soils in the area. These readings from Area C are 984, 1745 and 1076 Ohm/cm. The low reading in this test unit is not easily explained, but does support the survey results that of a low resistivity feature in this area.

Test Unit 1031.5N/876.5E Test Unit 1031.5N/876.5E was positioned to investigate the nature of an anomaly recognized in the preliminary magnetic survey data (Figure 6.14). This

test unit is located roughly in the northeast portion of Area A, approximately 50 m from any of the historic features. The intensity of its anomalous expression warranted testing. The surface of the test unit exhibited a slight linear depression running northwest/southeast through its center and sloped slightly to the southeast. It was hoped that perhaps this anomaly might be the remains of a privy. Control samples were collected from all four corners of the test unit. This test unit was excavated in two layers of seven arbitrary levels. These levels ranged in thickness from 0 to 12 cm, to a final depth of between 29.5 and 52 cm bgs.

Layer 1 was excavated in two levels. Due to the slope of the test unit and the underlying stratigraphy, each level was only partially excavated. This layer consisted of the sod and loose sediments extending to a maximum thickness of 2 to 5 cm before a layer change was made.

Layer 2 was excavated in five levels. Due to the original slope of the test unit and the slope of the underlying stratigraphy, three of the levels were only partially excavated. Layer 2 displayed a color change from the previous layer and exhibited a more developed soil structure that increased with depth. This layer extended to a maximum thickness of between 27.5 to 31 cm before the underlying stratum was exposed. The slope of the stratigraphic layer mimicked that of the slope identified at the surface so that excavations were deeper through the center of the test unit running from the northwest to the southeast corners. Consequently, by the second level of Layer 2, a stratigraphic change was identified primarily in the western portion of the test unit as well as in a small portion of the northeast corner. At the same level of excavation, approximately 20 cm bgs, barbed wire was exposed in four places of the test unit. This barbed wire only projected from the sediments of Layer 2. As excavations continued, more of the barbed wire was exposed displaying a nearly continuous line stretching from the southeast corner of the test unit to slightly east of the northwest corner. This alignment closely followed the alignment of the sloping surface of the test unit. Small amounts of charcoal were observed in the final level of Layer 2.

Four strata were recognized in the north (south-facing) and in the south (north-facing) wall profiles. These strata are illustrated in Figure 6.22 and are described below.

Stratum I — Stratum I is a grayish brown to brown (10 YR 5/2 to 5/3), clay loam with medium sand. Soil structure is single grain to weakly developed and subangular blocky. The stratum is 2 to 8 cm thick. The lower boundary is clear and smooth. Gravel is minimally present, accounting for up to 2 % of the sediment matrix. Gravels range in size from pebble to cobble. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Three fragments of miscellaneous metal were recovered from this stratum.

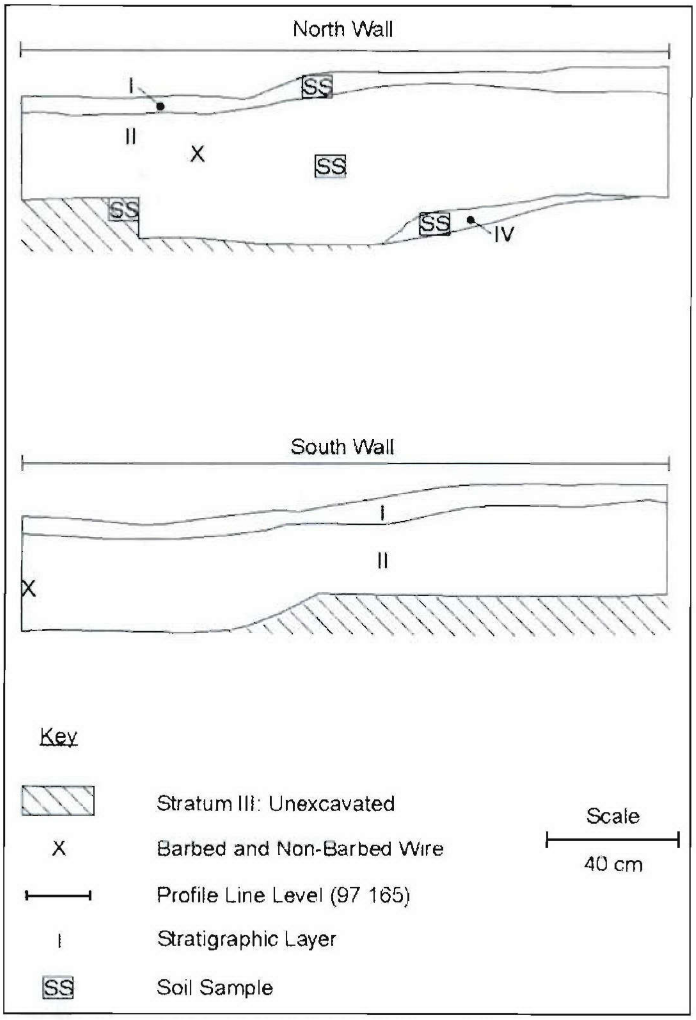


Figure 6.22. 1031.5N/876.5E, profiles, Area A.

Stratum II — Stratum II is a light brownish gray (10YR 6/2), clay loam with fine sand. Soil structure is sub-angular blocky to massive. The stratum is 26 to 50 cm thick. The lower boundary is clear and gradual. Gravel is minimally present, accounting for 1% of the sediment matrix. The sediments display a violent reaction to hydrochloric acid. Artifacts were recovered from this stratum.

Stratum III — Stratum III was not exposed in profile, but was identified on the floor of the test unit exposed in plan view. This stratum is a pale brown (10YR 6/3), silty clay loam with fine sand. Soil structure is moderately developed and sub-angular blocky. Gravel is minimally present, accounting for 1 to 3 % of the sediment matrix. Gravels are of pebble size. The sediments display a violent reaction to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum IV Stratum IV is a light gray (2.5YR 7/2), silt loam with fine sand. Soil structure is weakly developed and sub-angular blocky. The stratum is at least 7 cm thick. The lower boundary remains concealed. Gravel is not present. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. No artifacts were recovered from this stratum.

The majority of artifacts recovered from this test unit derived from Stratum II between 16 to 40 cm bgs. Barbed wire was predominate, although a few flaked-lithic artifacts and non-human bone were collected as well (Table 6.6). Two charcoal samples and a gastropod were recovered from 1/16 in wet screening.

Table 6.6.Results of Test Unit 1031.5N/876.5E, Area A.

Provenience				Artifacts Recovered						
				1/4"			1/16"			
Test Unit	Layer	Level	Thickness	Core	Lithic Debitage	Metal (g)	Lithic Debitage	Nonhuman Bone	Metal (g)	Total *
	1	1	0 - 5 cm			.3				-
	1	2	0 - 4 cm							-
	2	1	0 - 10 cm							-
1031.5N/876.5E	2	2	10 - 11 cm					2		2
	2	3	9 - 12 cm		1					1
	2	4	0 - 11 cm		3	64.9	1		55.3	4
	2	5	0 - 4 cm	1						1
			Total	1	4	65.2	1	2	55.3	8

* This category is composed of mostly highly fragmented and corroded ferrous materials, either representing the remains of tin cans, wire nails, barbed and non-barbed wire or simply unidentifiable metal remains. The unit of measurement is in grams and not included in the test unit totals.

Excavation of Test Unit 1031.5N/876.5E was terminated because the sterile deposits of Stratum III and Stratum IV were exposed across the floor of the test unit and the magnetic anomaly being investigated had been identified. The anomaly was a nearly linear, buried stretch of multiple strands of barbed wire which ran northwest/southeast across the test unit. This alignment of barbed wire followed the stratigraphic depression that had since been filled by Stratum II, and the wire probably represents an isolated or small segment of fence. The lithic artifacts indicate that the prehistoric component is minimally represented in this area of the site.

Prehistoric Hearth Excavations

Two prehistoric hearth features were identified in Area A (Figure 6.12). These features were represented on the surface by charcoal stained sediments surrounded by surface concentrations of fire altered rock. Two test units (984.9118N/889.5355E and 967.3086N/897.7135E) were placed over these features preliminary to excavation.

Hearth 1 Test Unit 984.9118N/889.5355E was positioned to investigate an area identified as a hearth feature. This feature was located roughly 10 m directly north of the historic well (Feature 1) in the southeast portion of Area A. Half of the feature fill was $^1/_8$ inch screened, while the remaining half was collected for flotation. Excavations revealed two cultural layers of deposition overlying natural strata. Figure 6.23 illustrates the plan view and profile of Hearth 1. The cultural layers and natural stratum are described below.

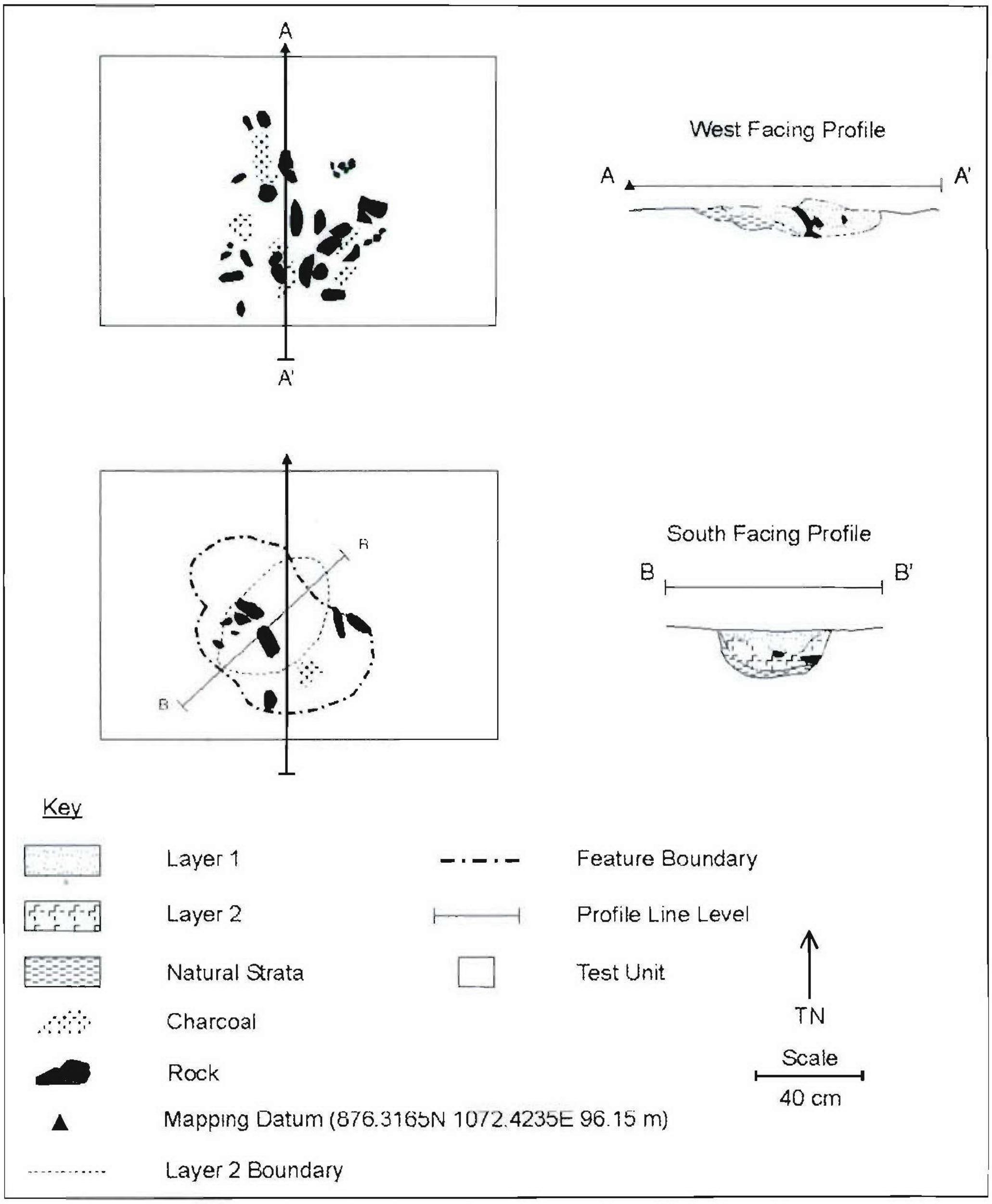


Figure 6.23. Hearth 1, plan views and profiles, Area A.

Layer 1 — Layer 1 is a grayish brown (2.5YR 5/2), fine sandy silt. Soil structure is weakly developed and single grained. This layer has a maximum thickness of 14 cm. The lower boundary is gradual and undulating. Gravel is present, accounting for 15 to 25 % of the sediment matrix. Gravels are angular and poorly sorted, ranging in size from pebble to cobble and largely composed of disintegrating sandstone. The sediments display a violent reaction to hydrochloric acid. Disturbance from bioturbation is present. Charcoal and fire-altered rock were noted throughout this layer but not collected. A concentration of fire-altered rock was observed at the lower boundary of this layer. No artifacts were recovered from this layer, although a charcoal sample was recovered from flotation.

Layer 2 — Layer 2 is a pale brown to very pale brown (10YR 6/3 to 7/3), sandy silt loam. Soil structure is weakly developed and single grained to blocky. This layer has a maximum thickness of 10 cm. The lower boundary is clear to diffuse and smooth. Gravel is minimally present, accounting for approximately 2 % of the sediment matrix. Gravels are angular, ranging in size from pebble to cobble. The sediments display a violent reaction to hydrochloric acid. Charcoal and fire altered rock are noted throughout this layer but were not collected. No artifacts were recovered through $^1/_8$ inch screening of this layer, but two flaked-lithic artifacts, a single nonhuman bone specimen, a macrobotanical sample and a charcoal sample were recovered from flotation.

Stratum I — Stratum I is a light olive brown (2.5YR 5/4), fine sandy silt. Soil structure is weakly developed and single grained. This stratum is at least 2 cm thick. The lower boundary remains concealed. Gravel is not present. The sediments display a very violent reaction to hydrochloric acid. Disturbance from bioturbation is present. No artifacts were recovered from this stratum.

Excavations were discontinued when it was determined that all of the feature fill had been removed, exposing the culturally sterile Stratum I. This stratum was identified as continuously present underlying the feature fill and extending beyond the feature boundaries at the surface of the test unit. The few artifacts that were recovered from the feature derived from Layer 2. The degree of disintegration observed on the fire-altered sandstone recovered from the feature fill, and the presence of two flaked-lithic artifacts, supports the interpretation of a prehistoric origin for this feature.

A single radiocarbon date from the combined charcoal samples recovered from Hearth 1 yielded a date of 580 +/- 80 radiocarbon years BP (Beta - 178245). The calendar calibrated date ranges between A.D. 1280 and A.D. 1450, falling within the Diversification period of the Late Prehistoric stage. These charred remains are identified as *Sabina monosperma* (one seed juniper). A flotation sample was processed from the fill and

sent to High Plains Macrobotanical for study. The report is present in Appendix II. Many seeds were collected and identified from this sample, although there were no burned seed specimens represented (Table 6.7). Taxa represented in the following: Solanum rostratum, *Helianthus petriolaris*, *Portulaca oleracea*, *Lappula squarrosa*, *Sabina monosperma*, *Chenopodium* spp., *Erysimum* spp.,and *Verbena macdougalli* (Bach 2003). Since none of these seeds are charred and all are present in the area today. Many of these seeds are considered weeds and probably are representative of intrusions in the feature, which was exposed on the surface.

Table 6.7 Results of Hearth 1.

	Identification	Part	Common Name	Comments	Uncharred whole	Uncharred Fragment
E1/2 Layer 1	*Sabina monosperma*	charcoal	one seed juniper	.05 grams		
	Solanum rostratum	seed	buffalo bur		35	8
	Helianthus petiolaris	seed	sunflower		2	3
	Portulaca oleracea	seed	ground ivy		7	
	Lappula squarrosa	seed	stickseed		1	
	Sabina monosperma	seed	one seed juniper			1
	Chenopodium spp.	seed	goosefoot		11	
	Erysimum spp.	seed	wallflower		2	
	unknown mustard spp.	seed	mustrad		4	
	Verbena macdougalii	seed	verbena		1	
	seed fragments	seed				7
	immature seeds	seed				112
Total					63	131
W 1/2	*Helianthus petiolaris*	seed	sunflower			1
	Solanum rostratum	seed	buffalo but		17	
	Sambucus coerules	seed	blue elderberry		2	
	Portulaca oleracea	seed	ground ivy		1	
Total					20	1

Gastropods from the flotation sample were also identified by High Plains Macrobotanical and the results presented in Appendix II. Gastropod taxa identified include

Pupilla blandi, *Vallonia gracilicosta*, and *Gastrocopta procera*. According to Bach (Appendix II), the species *Gastrocopta procera* is "found among vegetation: grass, shrubs, or woods area, but noted that woods are not required." (Rocque 1970:728-729). *Vallonia gracilicosta* is found in wooded areas and under dry leaves beneath aspen groves and cottonwood trees. It is common on the prairie in border areas in Iowa, but declines in numbers as one goes west, although Shimek (1930 in Rocque 1970:762) denies that it's presence in fossil deposits is evidence of a cooler climate.

Hearth 2 Test Unit 967.3086N/897.7135E was positioned to investigate an area identified as a hearth feature. This feature was located roughly 10 m southeast of the historic well (Feature 1) in the southeast portion of Area A. The feature appeared to be stabilized by vegetation and rose several centimeters above the surrounding ground surface. The test unit was subdivided and the west half was excavated to the surrounding ground surface, revealing an amorphous charcoal stain and a few pieces of fire-altered rock. These sediments were $^{1}/_{8}$ inch screened. The stained area was fully excavated and collected for flotation processing. Excavations revealed two strata. The strata are described below.

Stratum I	Stratum I is a pinkish gray (7.5YR 7/2), sandy loam. Soil structure is granular. This stratum is at least 7 cm thick. The lower boundary is unidentified. Gravel is not present. The sediments display a violent reaction to hydrochloric acid.
Stratum II	Stratum II is a pinkish gray (7.5YR 6/2), sandy loam. Soil structure is granular. This stratum has a maximum thickness of 4 cm. The lower boundary is abrupt and smooth. Gravel is not present. The sediments display a violent reaction to hydrochloric acid. Charcoal was noted throughout this stratum. No artifacts were recovered from these strata, although a macrobotanical sample and a charcoal sample were collected from flotation.

Excavation was discontinued when it was determined that all of the feature fill had been removed, exposing the culturally sterile Stratum I. This stratum was identified as continuously present underlying the feature fill and extending beyond the feature boundaries at the surface of the test unit. The charcoal-enriched sediments of Stratum II represent the extent of feature fill that has been severely deflated and disturbed by bioturbation and human activities at the site. This disturbance has resulted in a slight mixing of sediments between Strata I and II.

The fill from this feature was floated to recover macrobotanical remains. A very small amount of charcoal (identified as *Sabina monosperma*) was collected but was too small for radiocarbon dating. In addition to the charcoal six whole or fragmented seeds were identified (Appendix II). These include *Helianthus petiolaris*, *Chenopodium* spp. and Portulaca oleracea . The seeds were not charred and probably represent recent intrusions into this exposed feature.

We conclude this section on the test excavations in Area A. Following is a discussion of the material culture inventory.

Material Culture

Prehistoric Artifacts

Surface inventory of Area A identified two ground stone fragments and thirty-nine flaked-lithic artifacts. These surface artifacts were mapped and left in the field. Sixty-one prehistoric artifacts were collected from the subsurface investigations of Area A. These include one biface, one core, one flake tool, and fifty-eight pieces of flaked-lithic debitage. It is unlikely that the flaked-lithic specimens are related to the historic component of the site. More than likely, these specimens represent the historic disturbance of earlier deposits.

Table 6.8. Quantitative data on collected debitage, Area A.

	Hornfels/basalt	Quartzite/ Orthoquartzite	Chert	Chalcedony	Silicified Wood	Siltstone	Other	Total (%)
Size								
>1	1	1						2
1-1/2	3	7	2		2		1	15
<1/2	5	20	13	1	1	1		41
Total	9	28	15	1	3	1	1	58
Flake Type								
Shatter	3	4	6		2	1	1	17
Simple	4	18	5		1			28
Complex	2	6	2	1				11
Bifacial Thinning			2					2
Total	9	28	15	1	3	1	1	58
Cortex								
Present	3	6	2					11
Absent	6	22	13	1	3	1	1	47
Total	9	28	15	1	3	1	1	58

Flaked-Lithic Artifacts Of the fifty-eight flaked-lithic debitage specimens collected from Area A, thirty-five are broken flakes (approximately 60%) and twenty-three are complete flakes (approximately 40%). Smaller flake sizes predominate, as do simple flakes. Complex flakes and shatter were less predominant and occur at similar frequencies, while bifacial thinning flakes are minimally represented. The majority of the specimens (81%) lack cortex. Quantitative information on all of the collected debitage specimens is presented in Table 6.8. In general, the data illustrates the prevalence of smaller sized simple flakes with no cortex. These data suggest that early to intermediate stage lithic reduction activities occurred at this portion of the site. The smaller percentage of complex and bifacial thinning flakes present suggest that late stage reduction activities also occurred, but were less common.

The single biface specimen is unhafted. It is an unfinished, large-patterned biface characterized by sinuous bifacial margins and lack of pressure flaking or finishing. It measures 4 x 2.8 x 1.3 cm and weighs 15.5 g. It is complete, roughly lenticular in shape and made of quartzite. This specimen lacks any evidence of use wear. The flake tool specimen is unpatterned, exhibiting unimarginal use wear and both unimarginal and bimarginal retouch. It is complete and composed of hornfels/basalt. This specimen weighs 10.1 g. The core specimen is a hornfels/basalt rotated core exhibiting at least three striking platforms and flake scars. This specimen weighs 11.5 g.

Historic Artifacts

Glass

Bottle/Jar A total of seventy-one bottle/jar glass fragments (Table 6.9) were recovered from Area A including ten base fragments and nine neck fragments. The remaining fifty-two specimens are unidentifiable bottle/jar elements, but are believed to consist almost entirely of body fragments. The distribution of bottle/jar glass by color and element are organized by primary provenience in Table 6.9. The colors represented include clear (27), solarized purple (18), aqua (10), purple (9), brown (4), milk glass (2) and green (1).

Finish Finish characteristics are identifiable on three specimens. These include two crown finishes and one internal thread finish. Three additional specimens exhibit unidentifiable jar finishes requiring a cap or seal-type closure. One specimen may represent continuous thread, while a second may have had a friction cap.

Table 6.9. Distribution by color and element of surface and subsurface bottle/jar glass,Area A.

	Clear			Aqua		Brown	Solarized Purple			Milk Glass	Purple		Green	
	Frag	Base	Neck	Frag	Base	Frag	Frag	Base	Neck	Frag	Frag	Neck	Neck	Total
Surface	3		1			3	2		1			1		11
Domicile	12			1	4		1				2		1	21
Dugout	4	3	4	4	1	1	11	2	1	2	6			39
Total	19	3	5	5	5	4	14	2	2	2	8	1	1	71

Mold Ten of the specimens exhibit mold characteristics. Two specimens were produced from an Owens automatic bottle machine and one specimen was produced from a cup bottom mold. Twelve specimens show evidence of being blown into a mold but the type of mold is not known.

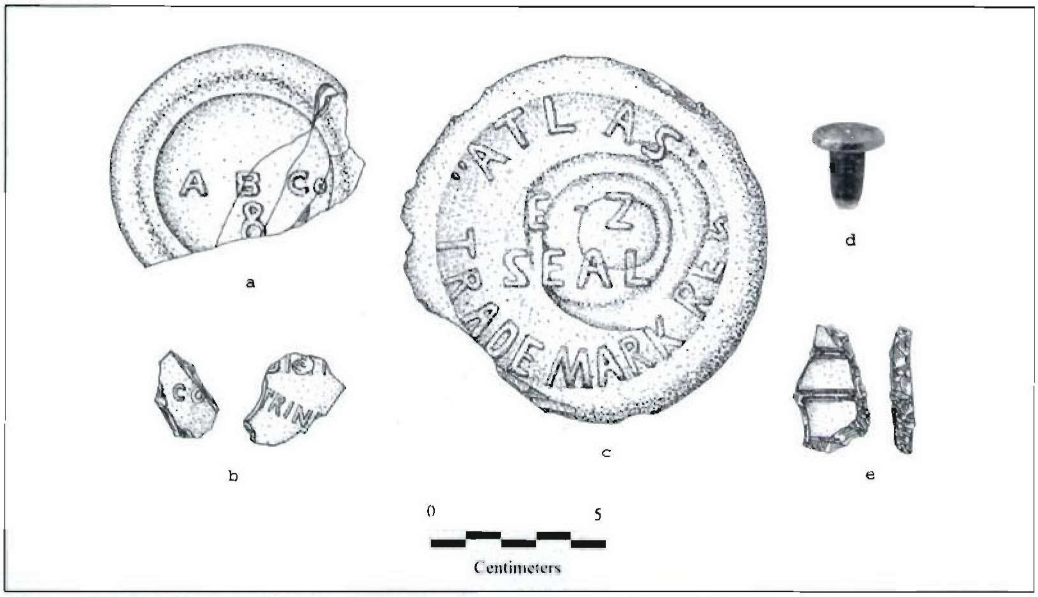


Figure 6.24 Glass artifacts, Area A: a) 5LA3421.105.553; b) 5LA3421.105.635; c) 5LA3421.105.641; d) 5LA3421.105.637; e) 5LA3421.105.008.

Maker's Mark Embossed maker's marks were identified on seven specimens. Four specimens, recovered adjacent to the domicile, refit to form the partial base of a bottle embossed with "A B Co" and manufactured by American Bottling Co. The number "8" is embossed below this mark (Figure 6.24.a). This particular mark was used from 1905 to 1929 despite the merger with Owens Bottle Co. in 1917 (Toulouse 1971: 30, 396). Two specimens, recovered from similar contexts in the dugout, are embossed with the mark of an unknown bottling company out of Trinidad, Colorado (Figure 6.24.b). Although Clint (1976: 190-193, 290-291) and Seamans and Robb (1969: 67-68) provide examples of businesses and bottle manufacturers that operated out of Trinidad, no exact matches were made. One specimen, recovered from the dugout, is the base of a fruit jar embossed with ""ATLAS" E-Z SEAL TRADE MARK REG." and manufactured by either Atlas Glass Co. or Hazel-Atlas Co. (Figure 6.24.c). Despite the merging of Atlas Glass Co. with Hazel Glass Co. in 1902, this mark was used from 1896 to 1964, being the favored mark for fruit jars (Toulouse 1971: 55-56, 239-242).

Closure One complete bottle stopper of solarized purple glass was recovered from the dugout. It is similar in appearance to either a club sauce or flat hood stopper (Figure 6.24.d).

Flat Glass Fourteen flat glass specimens were recovered from Area A. All but one were recovered from excavations within or adjacent to the domicile, while a single specimen was recovered from the dugout. These specimens are agua in color and range in thickness from 2 to 3 cm, while the majority are 2.5 cm thick.

Miscellaneous Glass Eight specimens of glass are unclassifiable. They were recovered from within and adjacent to the domicile as well as from the dugout. Their colors include clear (4), aqua (3) and milk glass (1). The milk glass specimen may be a button fragment.

Flaked Glass Eight specimens of flaked glass were recovered from the surface of Area A. These specimens are fragments of broken glass that exhibit traits suggesting retouch and use as tools. Recorded attributes were therefore similar to those recorded for lithic tools recovered from this site (Table 6.10). Figure 6.24.e illustrates a particularly salient example. Glass colors include brown (2), clear (4), and solarized purple (2). All of the specimens appear to be made from bottle or jar body fragments. All but one specimen are complete tools exhibiting unimarginal retouch. The one broken tool exhibits both unimarginal and bimarginal retouch. Unimarginal wear was identified on six of the specimens, while the remaining two specimens are either unutilized or utilization was not apparent.

Table 6.10. Flaked glass information, Area A.

Catalog Number	Glass Color	Broken	Weight (g)	Wear	Retouch
105.002	Clear	Yes	1.0	Unknown	Uni- and Bimarginal
105.003	Clear	No	6.0	Unimarginal	Unimarginal
105.004	Solarized Purple	No	.9	Unknown	Unimarginal
105.006	Brown	No	17.4	Unimarginal	Unimarginal
105.007	Brown	No	15.7	Unimarginal	Unimarginal
105.008	Solarized Purple	No	5.0	Unimarginal	Unimarginal
105.009	Clear	No	3.4	Unimarginal	Unimarginal
105.011	Clear	No	.6	Unimarginal	Unimarginal

Historic Ceramics Seventy-nine historic ceramics were recovered from Features 2 and 3. These are all fragments consisting of whiteware (38), stoneware (33), ironstone (6) and two unidentifiable ceramic types. Table 6.11 gives the historic ceramic distribution according to ceramic and item type and is organized by major provenience.

Table 6.11. Historic ceramic distribution by type from Feature 2 and Feature 3, Area A.

	Stoneware		Whiteware	Ironstone			
	Crock	Jug/ Crock	Unknown	Unknown	Cup	Unknown	Total
Domicile	1	9	7		2	1	20
Dugout	1	22	31	4		1	59
Total	2	31	38	4	2	2	79

Stoneware Stoneware accounts for 42 % of the historic ceramic assemblage. Stoneware vessels are usually in the form of large and heavy utility containers such as jugs and crocks (Dean 1992: IX-13). Two stoneware specimens exhibit the wide opening characteristic of a crock container. Measurements reveal a rim radius of approximately 5½ inches. The remaining stoneware specimens have unidentifiable openings and may represent either jug or crock containers. A base fragment measured approximately 6 inches

in radius.

The stoneware specimens are represented by two types of slips. The most predominant slip, occurring on twenty-six specimens, is cream-colored and applied to both interior and exterior surfaces of the vessel. The second slipping technique second is to apply a cream-colored slip to the exterior and a dark colored slip to the interior. The latter examples were recovered only from the dugout and occur on seven specimens.

Maker's marks were identified on two fragments recovered from the domicile. These marks are stenciled in cobalt blue and consists of the letters "HE W" on one specimen and "POT" on the other within a double oval border (Figure 6.25.a and 6.25.b). Not enough of the Maker's mark is present to be certain, but a similar design was used by Western Stoneware Co. out of Denver, Colorado (Clint 1976: 210). A significant number of fragments refit, including fragments recovered from separate features. The refit patterns and number of stoneware sherds present suggest that two, maybe three, stoneware vessels are represented in this historic ceramic assemblage. These include at least one vessel from each type of slip decoration discussed above.

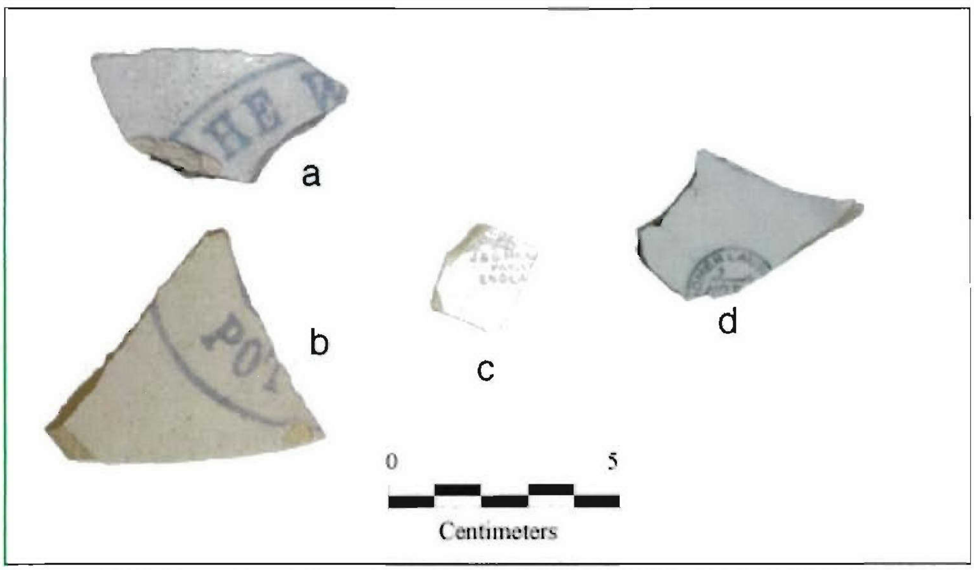


Figure 6.25. Ceramic artifacts, Area A: a) 5LA3421.105.549; b) 5LA3421.105.321; c) 5LA3421.105.619; d) 5LA3421.105.660.

Whiteware Whiteware accounts for approximately 48% of the historic ceramic assemblage. Whiteware is considered a refined earthenware fired at low temperature and identified by a thin, white pasted and porous body and a clear smooth glaze. Vessel forms usually include tableware such as plates, tea cups, and saucers (Dean 1992: IX-12). Different vessel elements such as rim and base fragments are present but due to their fragmentation, specific item types were not identifiable.

Decoration was identified on ten of the whiteware specimens. Four of these specimens recovered from the domicile refit to form the rim portion of an unidentified vessel. Decoration consists of a relief molded motif running along the inner surface of the rim and a decalcomania floral design of red and green. The same decalcomania decoration is present on a single specimen recovered from the dugout. Decorative, relief molded motifs were identified on five additional whiteware specimens. Decalcomania was identified on two additional specimens in green and orange. The design is unclear, but may be floral.

Maker's marks were identified on three fragments recovered from the dugout. One specimen bears the mark of the manufacturer J & G Meakin, Hanley, England (Figure 6.25.c). This mark was used after 1891 (Kovel and Kovel 1961: 202) and coincides with the McKinley Tariff Act of 1891 requiring the country of origin to be stamped on all imported pottery (Ormsbee 1959: 16). A second specimen bears the mark of the manufacturer Homer Laughlin (Figure 6.25.d). This mark identifies the specimen as hotel china and was used after 1877 (Lehner 1980: 88-90, 187). A third specimen bears just part of a letter. No additional data is available.

Ironstone Ironstone accounts for approximately 8% of the historic ceramic assemblage. Ironstone is a higher fired refined earthenware, less porous than whiteware and tending to be decorated primarily with relief molding. Vessel forms usually include tureens, platters, heavy plates and cups (Dean 1992: IX-12). Two specimens recovered form the domicile refit and represent the base of a cup. One specimen recovered from the dugout represents a footed vessel.

Decoration was identified on six of the ironstone specimens. The two cup specimens exhibit a thin wash of green that appears darkest at the base. The footed vessel specimen exhibits copper luster or gilding in an unidentifiable pattern on the foot and as a band around the rim. A second specimen recovered from the dugout exhibits the same design along the rim as well as relief molding. Two additional specimens recovered from the dugout exhibit similar relief molding.

One Maker's mark was identified. On the base of one of the cup specimens, the number "99" is visible along with additional but partially rubbed out letters or numbers above. No additional data is available.

Unknown Historic Ceramic Two unknown historic ceramic specimens were recovered. One specimen is too fragmentary (< $^1/_8$ inch) to identify. The other specimen, although fragmentary, may be part of a spool type insulator.

Metal

Cartridge Casings Fourteen cartridge casings were recovered and a sample of seven specimens is provided in Figure 6.26. Two were recovered from the surface and the remaining twelve were recovered from excavations within or adjacent to the domicile. Both single rimfire (11) and centerfire (3) casings are represented. One centerfire cartridge is self-

rimmed. The remaining cartridges are unrimmed. One specimen is unfired and still retains the bullet. Three cartridge calibers are represented: 38 caliber (3), 30 caliber (2) and 22 caliber (9). Headstamp information, cartridge type, caliber, body dimensions and production dates are listed in Table 6.12. Date ranges were acquired from Barnes (1971:59, 163, 164) and Berge (1980:223-224).

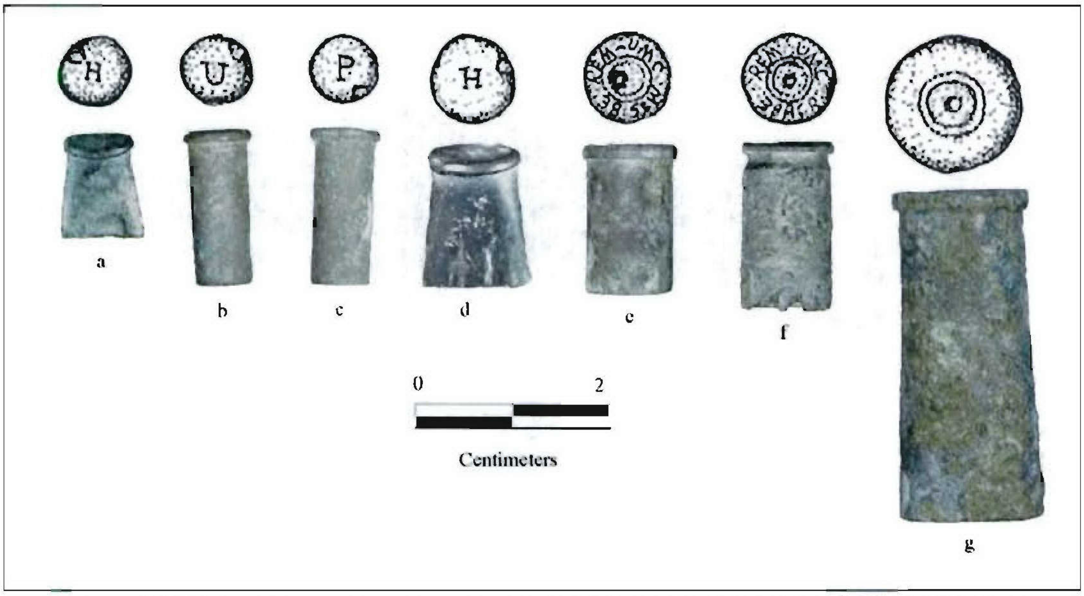


Figure 6.26. Cartridge casing, Area A: a) 5LA3421.105.575; b) 5LA3421.105.257; c) 5LA3421.105.441; d) 5LA3421.105.001; e) 5LA3421.105.579; f) 5LA3421.105.150; g) 5LA3421.105.503.

Table 6.12. General cartridge information, Area A.

Catalog	Headstamp	Cartridge Type	Caliber	Body Diameter (in)	Body Length (in)	Production Date Range
5LA3421.105.579	38 S&W REM-UMC	Centerfire	38	.343	.600	1877 -
5LA3421.105.575	H	Single Rimfire	22	.218	.420	1867 - present
5LA3421.105.580	U	Single Rimfire	22	.225	.424	1867 - 1902
5LA3421.105.441	P	Single Rimfire	22	.230	.623	1887 - 1934
5LA3421.105.503	38 WCF REM-UMC	Centerfire	38	.495	1.302	1874 -
5LA3421.105.257	U	Single Rimfire	22	.230	.610	1867 - 1902
5LA3421105.123	U	Single Rimfire	22	.245	.427	1867 - 1902
5LA3421.105.123	U	Single Rimfire	22	.245	.427	1867 - 1902
5LA3421.105.123	U	Single Rimfire	22	.245	.427	1867 - 1902
5LA3421.105.001	H	Single Rimfire	30	.310	.566	1867 - present
5LA3421.105.013	H	Single Rimfire	30	.302	.574	1867 - present
5LA3421.105.148	H	Single Rimfire	22	.228	.420	1867 - present
5LA3421.105.150	U	Single Rimfire	22	.228	.430	1867 - 1902
5LA3421.105.503	38 ACP REM-UMC	Semi-rimmed Centerfire	38	.346	.675	1900 -

Metal The remaining metal artifacts constitute a significant proportion of the historic

artifact assemblage. All of these specimens are badly corroded, often resulting in their fragmentation. Numerous artifact classes are identified, although a substantial amount remain unidentifiable due to the corrosion and fragmentation. As a result most of the metal artifacts are quantified by weight rather than by the number of fragments. Table 6.13 shows unidentifiable metal but also includes metal artifacts that occur with limited frequency. The miscellaneous metal category is primarily composed of eyelets, rivets, door hardware, pressed metal, metal ring, wire mesh and metal strap. These artifacts are categorized and discussed below according to specific item type.

Table 6.13. Distribution of metal artifacts, Area A.

	Tin Can (g)	Wire Nail (g)	Barbed/Nonbarbed Wire (g)	Miscellaneous Metal (g)	Total (g)
Surface	19.7				19.7 (.4 %)
Mag Anom			120.2	0.3	120.5 (2.2 %)
Domicile	440.1	141.5	39.4	311.9	932.9 (17.1 %)
Dugout	567.9	112.3	3593.4	97.5	4371.1 (80.3 %)
Total (g)	1027.7 (18.9 %)	253.8 (4.7 %)	3753 (69 %)	409.7 (7.5 %)	5444.2 (100 %)

Tin Cans There were no complete tin cans recovered from the site, but numerous tin can fragments were recovered (Table 6.13). Approximately 55 % by weight, were recovered from the dugout. All of the specimens, although badly oxidized and fragmented, exhibit characteristics of tin cans which include portions of seams, ends, lugs, and in one instance, embossing. Most of the specimens are fragments of cylindrical containers, although one fragment may be from an oblong or pear-shaped container. Identifiable side-seam types include lap and double seams. Tin and cast metal lugs used to attach a bail as a handle are also represented. One fragment is embossed with the letter C. The most intact specimen was recovered from the surface and consists primarily of one end of the can. This is a cylindrical hole-in-top can measuring 2 ½ inches in diameter with a ½ inch filler hole. The remaining specimens are too fragmented and deteriorated to identify. In total the tin can assemblage represents at least 11 cans for a total weight of 1027.7 g.

Nails Numerous wire nail specimens were recovered from excavations in the domicile and the dugout for a total weight of 253.8 g (Table 6.13). Slightly more wire nail specimens, approximately 56 % by weight, were recovered from the domicile. Most of these specimens are so badly corroded and fragmented that their size is indeterminable. Ten specimens recovered from within or adjacent to the domicile are complete and consist of 2d (2), 6d (1), 8d (5), 10d (1) and 20d (1) nails.

Wire Numerous fragments of wire were recovered for a total weight of 3753 g (Table 6.13). The majority of these, approximately 96 % by weight, were recovered from the dugout. These specimens are badly oxidized and fragmented, often no more than 2 inches in length, although a few longer samples were collected. Roughly half of the wire assemblage is two-strand wire that has oxidized and fused together. It is possible that the

other half also represents two-strand wire that has not fused together. Barbs are present on a number of wire specimens. It is unclear whether those specimens lacking barbs are of the non-barbed variety or fragments of deteriorated barbed wire. Barb types include half and full-round two-point as well as a few barbs that are wrapped more than a full turn. Longer specimens recovered from the magnetic anomaly exhibit uniform barb spacing at approximately 5 ½" apart.

Pressed Metal One pressed- metal sheet specimen was recovered from the domicile. This specimen is badly oxidized and fragmented. Prior to removal of this specimen from the field it was exposed and photographed to document its original shape. The pressed metal sheet is approximately 65 x 22 cm with an unidentifiable seam type running down its center. This specimen may have been modified from a tin can. The nail holes observed on some of the fragments suggest that it was used as building material and probably associated with the superstructure of the domicile.

Cabinet Latch Part of a metal cabinet latch mechanism was recovered adjacent to the domicile. This portion of the latch body contains the spring bolt catch/keeper and knob (Figure 6.27.a). The body measures 1 $^3/_4$" long and 1 $^3/_8$" wide, with a 1" long catch/keeper.

Stove Part Two identical cast iron stove legs were recovered from the domicile (Figure 6.27.b). These specimens are mostly complete, although a bit oxidized. Sinuous designs decorate their exterior. Together these two specimens weigh 1479.3 g. No other identifiable stove parts were recovered. The Sears, Roebuck and Co. Catalog from 1900 (1970) illustrate a number of cook and heating stoves with legs of similar form and decorated with a variety of designs.

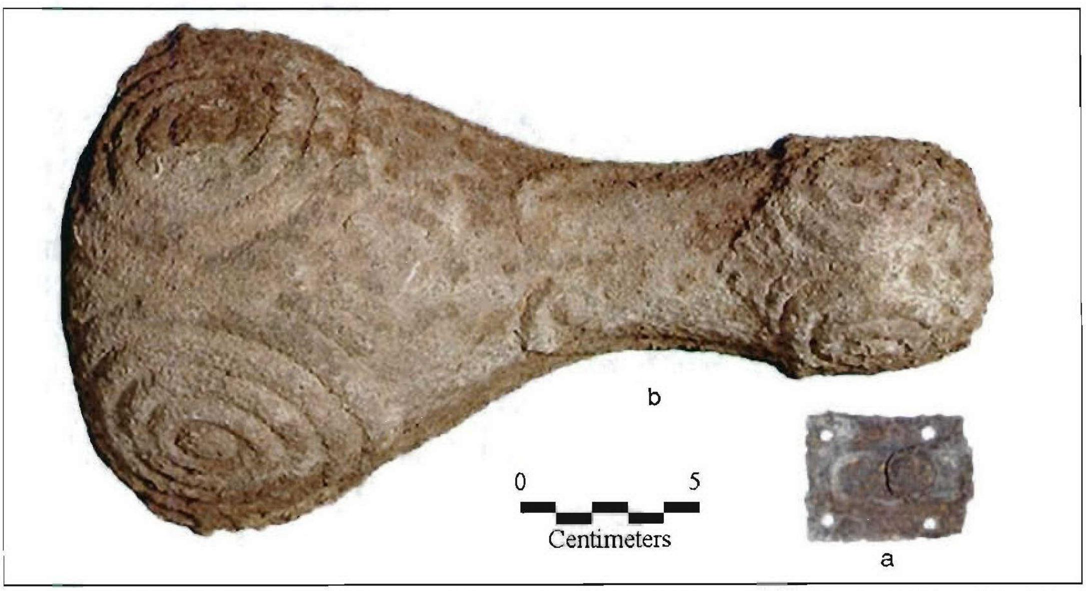


Figure 6.27. Metal artifacts, Feature 2, Area A: a) 5LA3421.105.160; b) 5LA3421.105.195.

Metal Ring One metal ring was recovered from the domicile. The ring is $^1/_8$" in thickness and has a diameter of $^7/_8$". Various types and sizes of rings were used on saddles, harnesses, collars and leather straps.

Wire Mesh Fragments of wire mesh were recovered from the domicile. These fragments are badly corroded and none are more than ½"length. The mesh is $^1/_{16}$" and may have been used on a window or door.

Metal Strap Fragments of two metal straps were recovered from the domicile. They are approximately ½ " or $^1/_4$" in width. The tips of these specimens are capped with a separate piece of metal. Their function remains unclear.

Eyelets Two eyelets were recovered from to the domicile. One specimen has a flange diameter of $^5/_{16}$" and an inner diameter of $^3/_{16}$". The second specimen has a scored flange and has been flattened, altering its shape. Eyelets have commonly been used for apparel, but are also widely used for a variety of purposes. In particular, scored eyelets are used as lace holes in shoe uppers.

Rivets One complete rivet was recovered from the domicile. This specimen is approximately ½ " in diameter and $^1/_4$" in length. Similar specimens recovered from the site are associated with leather objects and were used to fasten leather, and in one instance textile, together.

Unidentifiable Metal A small percentage of the metal artifact assemblage, 5.1% by weight, remains unidentifiable. These specimens are primarily composed of fragments of corroded metal that are so small to prevent identification or classification.

Leather Sixty-one leather artifacts were recovered from the domicile and the dugout. Nine specimens are connected to metal, such as nails or rivets, and one specimen is connected with metal and textile. The specimens associated with a pair of boots are connected with a combination of metal and rubber. Overall, deterioration of the leather artifacts has resulted in numerous unidentifiable fragments. Based on similar morphological characteristics and manufacturing attributes, it is likely that the majority of these unidentifiable fragments represent either portions of leather shoes or straps.

Two partial leather boots were recovered from the dugout and may constitute a pair. They consist of portions of sole, heal and uppers. The two boots, although deteriorated, exhibit similar proportion and manufacturing attributes. The uppers appear machine-sewn based on the uniformity of the needle holes. One boot retains a pair of seven metal eyeholes on the uppers, used to lace it up. The soles are nailed and sewn from toe to heel and a steel shank is in the arch of one boot. Two leather boot fragments were recovered from the domicile, which includes a portion of an upper and a portion of a sole. This upper has seven metal eyeholes similar to that recovered from the dugout and may be the missing upper from the second boot.

The leather artifact assemblage also consists of numerous leather strap fragments. These leather straps vary in width from ½ " to 1" and often exhibit punched holes. One complete specimen, recovered from the domicile, measures approximately $^{3}/_{4}$" in width and 12" in length. Five punched holes are present. One end has been stamped "909" and the other end has stitching scars where another piece of leather was attached. The remaining strap specimens are fragments but exhibit similar characteristics suggesting that many of these specimens represent pieces of harness or belt.

One unusual leather specimen is composed of five separate fragments of leather attached by two metal rivets. A similar specimen consists of a rectangular piece of leather with a metal rivet at either end. One of the rivets attaches a fragment of leather and textile, probably canvas. The function of these two specimens is unknown.

Wood A few samples of wood were collected for a total weight of 134.2 g. These samples were primarily collected from the domicile except for one small sample (.4 g) that was collected from the dugout. The sample collected from the dugout consists of a fragment of milled lumber $^{1}/_{8}$" thick. The samples collected from the domicile include $^{1}/_{8}$" thick fragments of milled lumber (one of the more complete fragments measured 1 $^{3}/_{4}$" in width), one fragment of milled lumber $^{13}/_{16}$" thick that is painted blue on one surface and numerous wood fragments, some of which are partially burned, some of which are painted blue and some of which are painted blue over green paint. A few of the blue painted fragments are painted over bark. One fragment of milled lumber exhibits what may be remnants of a plaster coating across one surface.

The milled lumber specimens may reflect wood associated with the superstructure of the domicile. It is unclear what method of construction was employed, although the dimensions of the milled lumber fragments suggest their use as cladding material for the walls or roof. As such, they would have been used to span the open spaces between structural framing, and if the structure were plastered, provide a surface for the mortar. The structural framing itself has apparently been dismantled and removed from the site. The burned fragments of wood recovered from the domicile are of greater thickness and do not appear to be milled. It is unclear whether these specimens were utilized in the construction of the domicile or reflect fire wood.

Shell Numerous shell fragments were recovered. The majority of these specimens derived from the domicile (1 g), while only a few fragments were recovered from the dugout (.2 g). These are fragments of eggshell probably associated with subsistence/economic activities.

Textile Samples of textile were recovered from two separate contexts within the domicile. One sample was adhered to nonhuman faunal remains. These sample are badly decomposed and fragmentary, They probably represent the remains of canvas material that may have been used for any number of purposes.

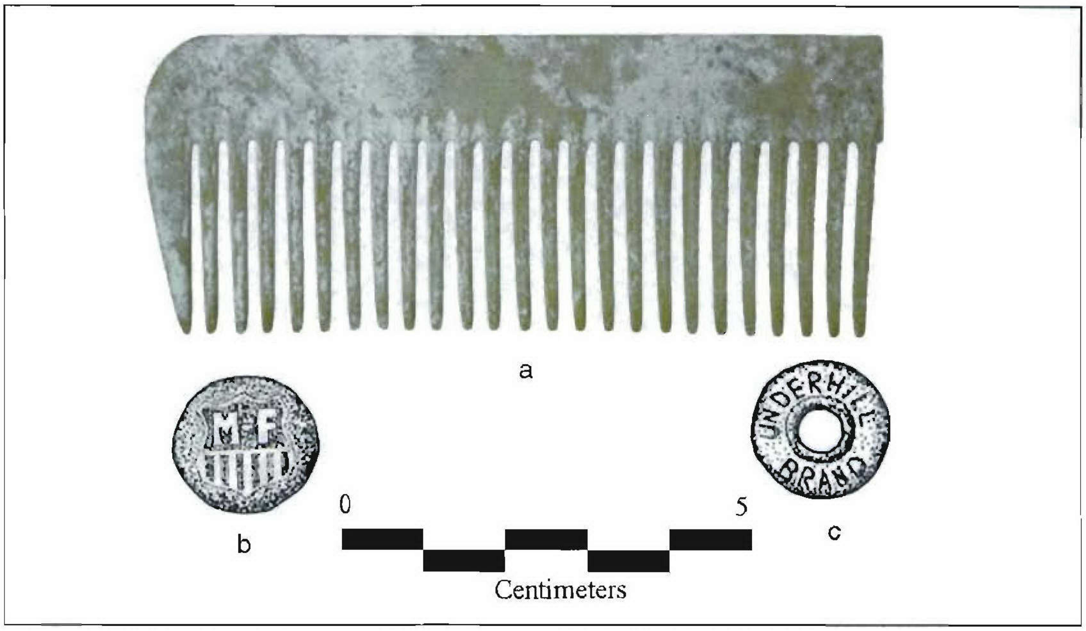


Figure 6.28. Comb and button artifacts, Area A: a) 5LA3421.105.508; b) 5LA3421.105.165; c) 5LA3421.105.014.

Plastic Three specimens of plastic were recovered from the domicile. Two specimens are molded plastic fittings of unknown use. One of these is complete and greenish in color. The other is broken and black in color. The third specimen is part of a hair comb constructed of Celluloid (cellulose nitrate) (Figure 6. 28.a). Cellulose nitrate is an early plastic used in the late nineteenth and early twentieth centuries to imitate ivory, bone and tortoise shell for a variety of objects including hair combs (Whelchel 1992: 107).

Rubber Six specimens of rubber were recovered. Two specimens recovered from the domicile are fragments of rubber ring seals used for canning with glass jars. The other four specimens are fragments of shoe/boot parts associated with the sole. These later specimens were identified through a comparison with more complete boot specimens recovered from the dugout.

Utensil Part of one utensil was recovered from the domicile. What remains is half of the wooden handle and a few fragments of badly corroded metal. The metal that remains would have resided between the wooden handles and serve to fasten them together. The remainder of the specimen is missing. It is unclear what type of utensil it is.

Button Eight whole or fragmented buttons were recovered. Three buttons are constructed of shell. These are sew-through type hole buttons, two of which are complete exhibiting a 2-hole and a 4-hole construction. Their sizes in diameter include $^{3}/_{8}$" (16 lines), $^{7}/_{16}$" (18 lines) and ½" (20 lines). These sizes fit within the range of shirt and dress buttons (Gillio et al. 1980: 21). One complete button is constructed of rubber. This is a sew-through type

hole button of 4-hole construction. It is 1 ${}^{1}/_{16}$" in diameter (42 lines). Two button fragments are constructed of porcelain. These fragments refit forming a sew-through type hole button ${}^{9}/_{16}$" in diameter (22 lines). This button size falls between the range of shirt and dress buttons, and buttons for vests, coats and jackets (Gillio et al. 1980: 21).

Two buttons are constructed of metal. These are two-piece metal buttons that are corroded and incomplete. They are represented by the face of the button and are missing the shank. One specimen is ${}^{11}/_{16}$" in diameter (26 lines). This size is within the range of vest, coat and jacket buttons (Gillio et al. 1980: 21). The face is stamped with a shield insignia similar to the shield from the Coat of Arms of the United States. The letters "M-F" are stamped in the chief (Figure 6.28.b). The other specimen is ${}^{5}/_{8}$" in diameter (24 lines). This size is within the range of vest, coat, and jacket buttons (Gillio et al. 1980: 21). The center is hollow, ${}^{3}/_{16}$" in diameter. The face is stamped with "UNDERHILL BRAND" (Figure 6.28.c) and may be associated with Underhill Union Made buttons.

Clinker Three artifacts are referred to as clinkers. These clinkers are globular masses of mostly unidentifiable burned material that have fused together as if formed in a furnace or stove. Their context in association with the stove legs recovered from the domicile supports such an inference. Identifiable material fused within these specimens include granule- and pebble-size gravel and fragments of broken glass. A portion of one specimen exhibits an organic structure similar to coal or charcoal. These specimens probably reflect the burning of trash within the domicile.

Unidentified Objects Seventeen specimens are of unidentifiable composition. Several of these specimens are fragments of thin tabular or sheets of black vitreous material recovered from within and adjacent to the domicile. These fragments are similar to those found in association with the boots recovered from the dugout and may be deteriorated fragments of rubber used in shoe construction. A single specimen recovered from adjacent to the domicile and of relatively small proportion (< ½ ") may be a fragment of adobe or burned earth. If this specimen is adobe, it is the only evidence of it at the site and therefore probably was not a very significant material used in the construction of the domicile. Other items recovered from the general vicinity of the domicile include small (< ${}^{1}/_{4}$") fragments of turquoise-colored material. Similar colors have been identified on the wood samples collected from the domicile and may reflect chips or bits of paint.

Summary and Conclusions

Results of surface and subsurface investigations of Area A indicate the presence of two cultural components. The earliest component is prehistoric, represented on the surface by a scatter of flaked-lithic artifacts, two metate fragments and two hearth features. The distribution of prehistoric surface artifacts extends beyond the site boundaries to the southwest and continues across the remaining areas of the site. Subsurface investigations recovered one of each: biface, core, flake tool, and fifty-eight flaked-lithic artifacts. A radiocarbon date on charcoal recovered from Hearth 1 produced a calibrated date that ranges

between A.D. 1280 and A.D. 1450. This range falls within the Diversification period of the Late Prehistoric stage, and more specifically, within the Apishapa phase (Zier and Kalasz 1999). Although flaked-lithic artifacts were recovered from the subsurface investigations, a buried ethnostratigraphic horizon was not identified. The subsurface context of most of these artifacts can be attributed to the disturbance and mixing of sediments as a result of historic activities or from the mixing of sediments as a result of bioturbation. The lack of diagnostic cultural remains and the absence of a buried cultural horizon indicates that the prehistoric component identified in Area A is not sufficient to warrant a recommendation of eligibility for the NHRP.

The later cultural component is historic, identified on the surface by five historic features and a rich surface scatter of historic artifacts. The historic features consist of a well, domicile, dugout and two adjoining livestock-related structures. Historical documentation indicates that these structures can be attributed to the Harry Leplatt homestead, patented in 1921 with an adjoining land patent issued in 1926. Based on the average of five years to 'prove up' a homestead claim, Harry Leplatt probably occupied this site as early as 1916. The nature of the land patent transfers suggest that Harry Leplatt was originally involved with dry farming, but ultimately turned to raising livestock. The archeological record generally supports the model of livestock raising at the site.

Subsurface investigations on the historic component consisted of archeological testing of the domicile and the dugout and excavations conducted to ground-truth both magnetic and resistance anomalies. Archeological testing of the domicile recovered cultural remains attributable to domestic and subsistence activities, as well as construction material associated with the superstructure. Faunal remains constitute a significant proportion of the artifacts recovered from the domicile. Analysis of these remains (see Appendix VI) reveal a high concentration of elements considered as belonging to domesticated sheep (*Ovis aries*). Many of these remains exhibit modifications associated with butchering activities. Other subsistence-related remains were relatively few in number suggesting that sheep constituted a fairly large part of the occupants livelihood and/or diet.

Archeological testing of the dugout recovered similar classes of artifacts, although occurring at different frequencies. Artifact frequency comparisons for the domicile and the dugout illustrate a difference in the pattern of refuse disposal, as well as emphasizing the different activities conducted at the site. In general, the domicile contained a more diverse artifact assemblage, particularly related to personal and domestic activities. The dugout, on the other hand, produced a substantial amount of metal artifacts (approximately 80 % of the Area A total). The majority of these (approximately 82%) are barbed and nonbarbed wire. Similarly, much of the cultural material recovered from the magnetic anomaly testing was barbed wire. The presence of such quantities of wire, combined with the quantities of recovered sheep remains, strongly supports the model of livestock related activities at the site.

Management Recommendations

The historic research combined with the subsurface testing conducted at the Harry Leplatt homestead provide sufficient data to warrant a recommendation of eligibility for the NRHP. The origins of the Harry Leplatt homestead are during the historical context of the Later American Period (1891–1984). It was during this period that the PCMS experienced the most intense era of settlement in its history (Friedman 1985: 122). Unlike other portions of the Great Plains, southeast Colorado did not have many European immigrants (Friedman 1985: 196). The combination of historical and archeological data for this homestead can therefore address the areas of significance related to ethnic heritage and settlement, particularly ethnic settlement in the rural west.

The historic structures of the Leplatt homestead, despite lacking architectural significance, do possess archeological significance. Two of the five historic features were tested, illustrating the presence and integrity of intact cultural deposits. Numerous diagnostic artifacts were recovered from subsurface contexts and it is highly probable that more remain. The investigation of the dugout indicates that deposits extend to at least a maximum depth of 107 cm bgs. Although less extensive, it is probable that the remaining features possess similar intact deposits and integrity.

CHAPTER 7
AREA B

Location and Description

Area B comprises the largest surface area of the site. It is located along the eastern portion of the site adjacent to Areas A, C and D (Figure 7.1). It is the location of the main site datum established by NMSU during the assessment project completed in 2000. This datum was used as the main site datum by FLC as well. The boundaries between these areas are defined by topographical features. The unnamed tributary of Big Water Arroyo that cuts across the site separates Area B from Areas A and C. The rock ledge running approximately parallel with Big Water Arroyo separates Area B from Area D. The boundaries to the north and east are defined by the fenced site boundary. This area of the site slopes gradually to the east and south away from the rock ledge. Bedrock and sandstone boulders are exposed along the western boundary of Area B along the rock ledge, but become buried by sediments to the north and east. Occasional sandstone outcrops emerge throughout Area B where deposition is minimal. Work completed in Area B consisted of the mapping of the surface artifacts, the vehicular disturbance from tactical maneuvers and the identifiable test units from previous archeological excavations. All prehistoric surface artifacts except ground stone were collected and analyzed in the lab. The historic artifacts were mapped but not collected. Originally this area was defined by the DU crew as having at least four areas of rock concentrations that may represent deflated features, two prehistoric architectural features and at least eight bedrock metates. Along with these features was a sparse scatter of prehistoric artifacts that included cores, non-tool debitage, choppers, bifaces, retouched flakes and the base of a possible Paleo Indian projectile point. The two features are described as stone enclosures that could be the remains of stone circles. Other stone concentrations were noted and these were interpreted to be possible hearth features.

Surface Investigations

A pedestrian inventory was systematically conducted across Area B. All surface artifacts were pinflagged and mapped with the Total Station (Figure 7.2). These artifacts include fifty-six flaked-lithic artifacts, two pieces of ground stone, twelve bedrock metates, two fragments of miscellaneous metal and a piece of glass. Eight bedrock metates had been previously recorded along the sandstone rim (Angulski 1984). FLC checked the bedrock metate forms for accuracy but did not rerecord the metates. Sixteen previously excavated test units were located and mapped. These units were excavated as a part of an assessment project conducted in 2000 by NMSU. The northern rock concentration is believed to be the original prehistoric Feature A 1, and the mapped stone circle is thought to be Structure A 4. These were mapped but were not investigated further.

Instructions to FLC by DECAM archeologists were to collect all surface flaked-lithic artifacts from this portion of the site, and no further archaeological work was recommended.

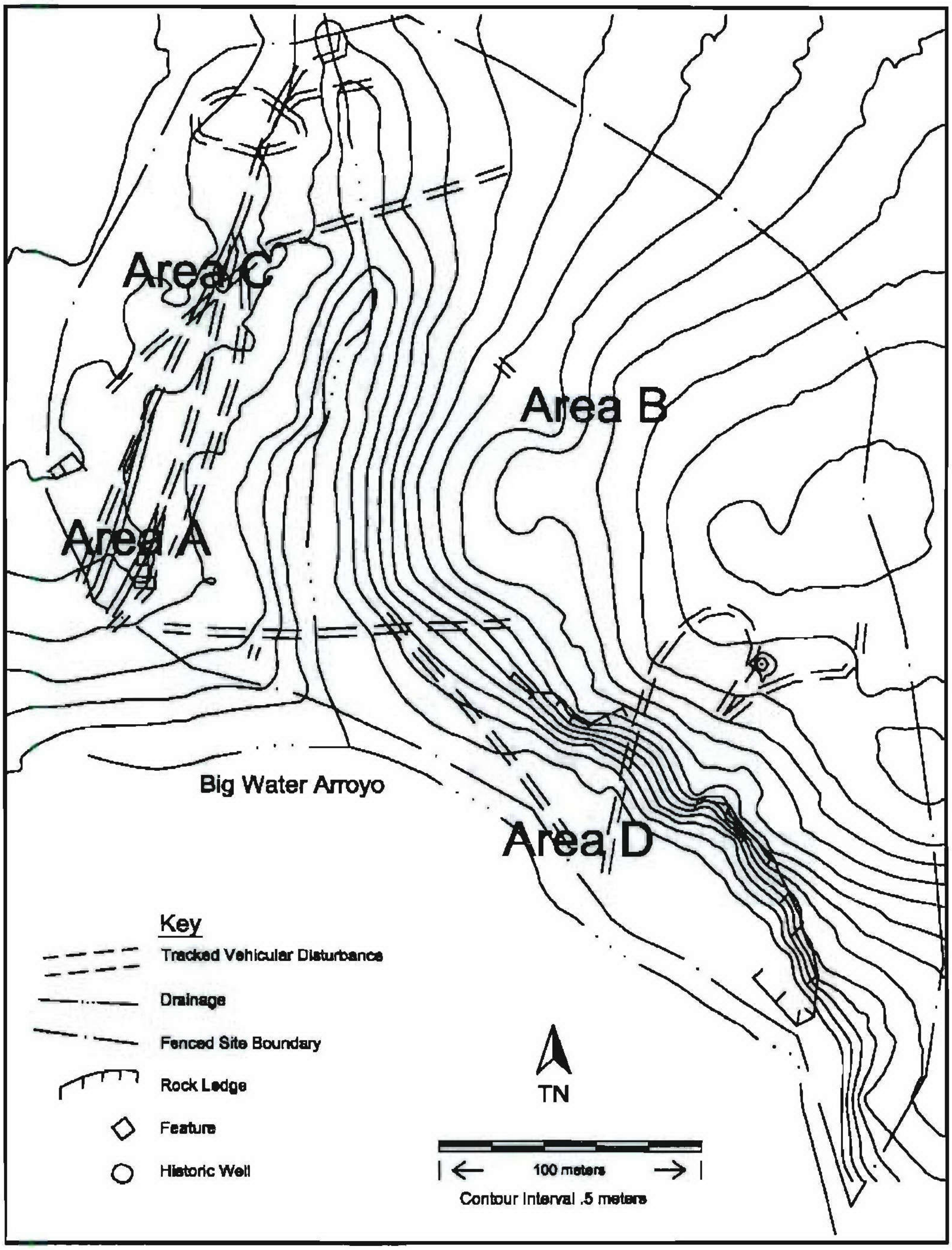


Figure 7.1. Topographic map of site area, 5LA3421.

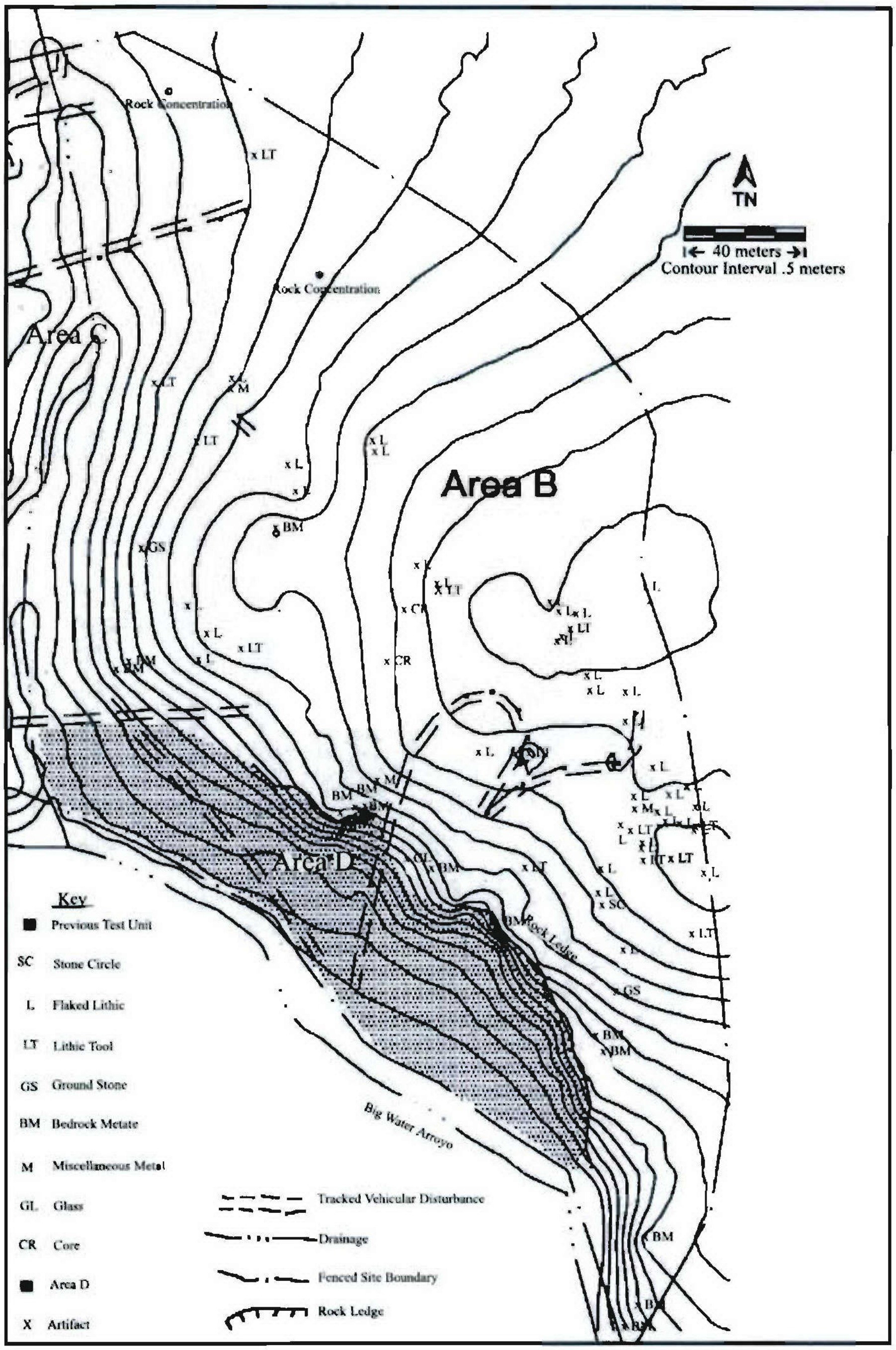


Figure 7.2. Topographic map of Area B.

Material Culture

Artifacts collected consisted exclusively of flaked-lithic artifacts. These include two cores, thirteen flake tools and forty-one non-tool flaked-lithic debitage. The two core specimens are irregularly shaped core shatter. One is composed of chert and weighs 18.6 g, while the other is composed of a fine grained igneous stone and weighs 23.7 g. The latter specimen exhibits cortex across less than 50% of the artifact.

The thirteen flake tools consist of five patterned and eight unpatterned tools. Identifiable tool types consist of six scrapers and one flake perforator. The remaining flake tools are represented by unpatterned and unclassifiable tools exhibiting retouch and/or utilization. Quantitative information of the thirteen flake tools recovered from Area B is presented in Table 7.1.

Table 7.1. Quantitative data on flaked-lithic tools, Area B.

Cataloge	Tool Type/ Technomorphological Class	Raw Material	Broken	Weight	Cortex	Wear	Retouch
5LA3421. 015.016	unknown/patterned flake tool	chert	no	2.2	absent	unimarginal/ bimarginal	unimarginal
5LA3421. 105.018	unknown/retouched or utilized flake tool	felsite	yes	3.2	absent	absent	bimarginal
5LA3421. 105.019	unknown/patterned flake tool	chalcedony	no	2.7	>50%	unimarginal/ bimarginal	unimarginal
5LA3421. 105.020	end scraper/patterend flake tool	argillite	no	8.5	• 50%	bimarginal	unimarginal
5LA3421. 105.024	unknown/retouched or utilized flake tool	chert	no	0.5	absent	unimarginal/ bimarginal	unimarginal
5LA3421. 105.027	unknown/retouched or utilized flake tool	chert	yes	0.6	absent	bimarginal	absent
5LA3421. 105.044	flake perforator/retouched or utilized flake tool	hornfel/ basalt	yes	5.2	absent	bimarginal	absent
5LA3421. 105.047	unknown/patterned flake tool	chert	no	12.7	absent	unimarginal	unimarginal
5LA3421. 105.049	unknown/retouched or utilized flake tool	chert	yes	0.6	absent	unimarginal/ bimarginal	absent
5LA3421. 105.051	unknown/retouched or utilized flake tool	obsidian	yes	1.6	>50%	unimarginal/ bimarginal	absent
5LA3421. 105.053	unknown/retouched or utilized flake tool	chert	no	1.2	absent	bimarginal	absent
5LA3421. 105.064	unknown/retouched or utilized flake tool	hornfel/ basalt	no	6.7	absent	absent	unimarginal
5LA3421. 105.071	side scraper/patterned flake tool	chert	yes	2.2	absent	unimarginal	unimarginal

Of the forty-one non-tool flaked-lithic debitage collected, twenty-three are broken flakes and eighteen are complete flakes. Small to medium flake sizes predominate, as do simple flakes and shatter. Complex flakes were less predominant and bifacial thinning flakes are minimally represented. The majority of these specimens (75.6%) lack cortex. Quantitative data on all of the debitage specimens are presented in Table 7.2. In general, the data illustrate the prevalence of small- to mid-sized simple flakes and shatter with cortex absent. This data suggest that early- to intermediate-stage lithic reduction activities occurred at this portion of the site. The smaller percentage of complex and bifacial thinning flakes present suggest that late stage reduction activities also occurred, but were less common.

Table 7.2. Quantitative data on collected debitage, Area B.

	Hornfels/basalt	Quartzite/ Orthoquartzite	Chert	Silicified Wood	Argilite	Other	Total (%)
			Size				
>1	2	3					5 (12.2)
1-1/2	4	6	7		2	2	21 (51.2)
<1/2	4		8	1	2		15 (36.6)
Total (%)	10 (24.4)	9 (22)	15 (36.6)	1 (2.4)	4 (9.6)	2 (4.9)	41 (100)
			Flake Type				
Shatter	3	1	10	1	2	1	17 (41.5)
Simple	5	4	2		1	1	14 (34.1)
Complex	2	4	2		1		9 (22)
Bifacial Thinning			1				1 (2.4)
Total (%)	10 (24.4)	9 (22)	15 (36.6)	1 (2.4)	4 (9.6)	2 (4.9)	41 (100)
			Cortex				
Present	4	2	2	1	1		10 (24.4)
Absent	6	7	13		3	2	31 (75.6)
Total (%)	10 (24.4)	9 (22)	15 (36.6)	1 (2.4)	4 (9.6)	2 (4.9)	41 (100%)

Summary and Conclusions

Results of the surface investigations of Area B indicate the presence of a prehistoric component, represented by a scatter of flaked lithic artifacts, twelve bedrock metates, and two fragments of ground stone artifacts. The distribution of prehistoric artifacts extends across Area B, although small lithic concentrations occur along the eastern boundary of the site and the bedrock metates occur along the exposed rock ledge.

Despite a few historic artifacts recovered from the surface of Area B, including recent metal cans, there is not a significant historic presence to identify a historic component. These particular artifacts may represent trash/debris from military activity. Disturbance from tactical maneuvers (i.e., tracked vehicular disturbance) is evident across Area B, particularly in the northwest corner adjacent to Area C as well as adjacent to Area D further to the south. These two areas have experienced continuous disturbance, being used as a point to access higher ground. Tactical maneuvers also occur on the exposed bedrock.

The surface collection of Area B recovered an artifact assemblage composed primarily of flaked-lithic debitage and expedient tools. No diagnostic artifacts were recovered. Previous archeological testing by NMSU had been conducted in portions of Area B containing disturbance from tactical maneuvers. No additional subsurface investigations were conducted in Area B by FLC. Based on the surface inventory conducted by FLC without the aid of the results of subsurface excavations conducted by NMSU, it is our recommendation that the protective fence be reduced omitting Area B. Any further data retrieval from this area is not recommended.

CHAPTER 8
AREA C

Location and description

Area C is located in the northwest portion of site 5LA3421 (Figure 8.1). The boundaries of Area C are defined by the military fence to the north and west and a small tributary drainage of Big Water Arroyo to the east. The southern boundary of Area C is defined by the northern extent of historic artifacts and features, which separates Area A and Area C. The topography of Area C is open and relatively level but slopes gently towards the south and east as it gets closer to the drainage. Although a few historic artifacts extend into Area C from the south, it is predominantly characterized by a scatter of prehistoric artifacts.

Work completed in Area C consisted initially of the inventory and mapping of the distribution of surface artifacts, vehicular disturbance from tactical maneuvers and identifiable test units from previous archeological excavations. Subsurface investigations included the excavation of twenty-five 1 m x 1 m test units. All but one of the test units were randomly positioned to sample the subsurface of Area C.

Surface Investigations

A pedestrian inventory in 5 m wide intervals was systematically conducted across Area C. All surface artifacts were pinflagged and mapped with the Total Station (Figure 8.2). These artifacts were dispersed across Area C with small concentrations occurring in the southern portion of the area. These artifacts include two fence staples, one historic ceramic, one metate fragment, five prehistoric ceramics, one tested chert cobble and seventy-five pieces of non-tool flaked-lithic debitage. The five prehistoric ceramics were found in close proximity in the south-central portion of Area C and were collected. One metate fragment was identified along the western site boundary. A non-portable ground stone form was completed for the metate fragment. Aside from the prehistoric ceramics, all surface artifacts were mapped, analyzed and left in the field.

Subsurface Investigations

A total of twenty-five test units were excavated in Area C. These test units are referred to by the coordinates of their northwest corner in relation to the main site datum (1000N, 1000E) located in Area B. Table 8.1 summarizes the individual test units' size, total layer/levels excavated and final depths below ground surface. One test unit (1080N/880E) was positioned to investigate an area where prehistoric ceramics were identified on the surface. The remaining twenty-four test units were randomly positioned across the area.

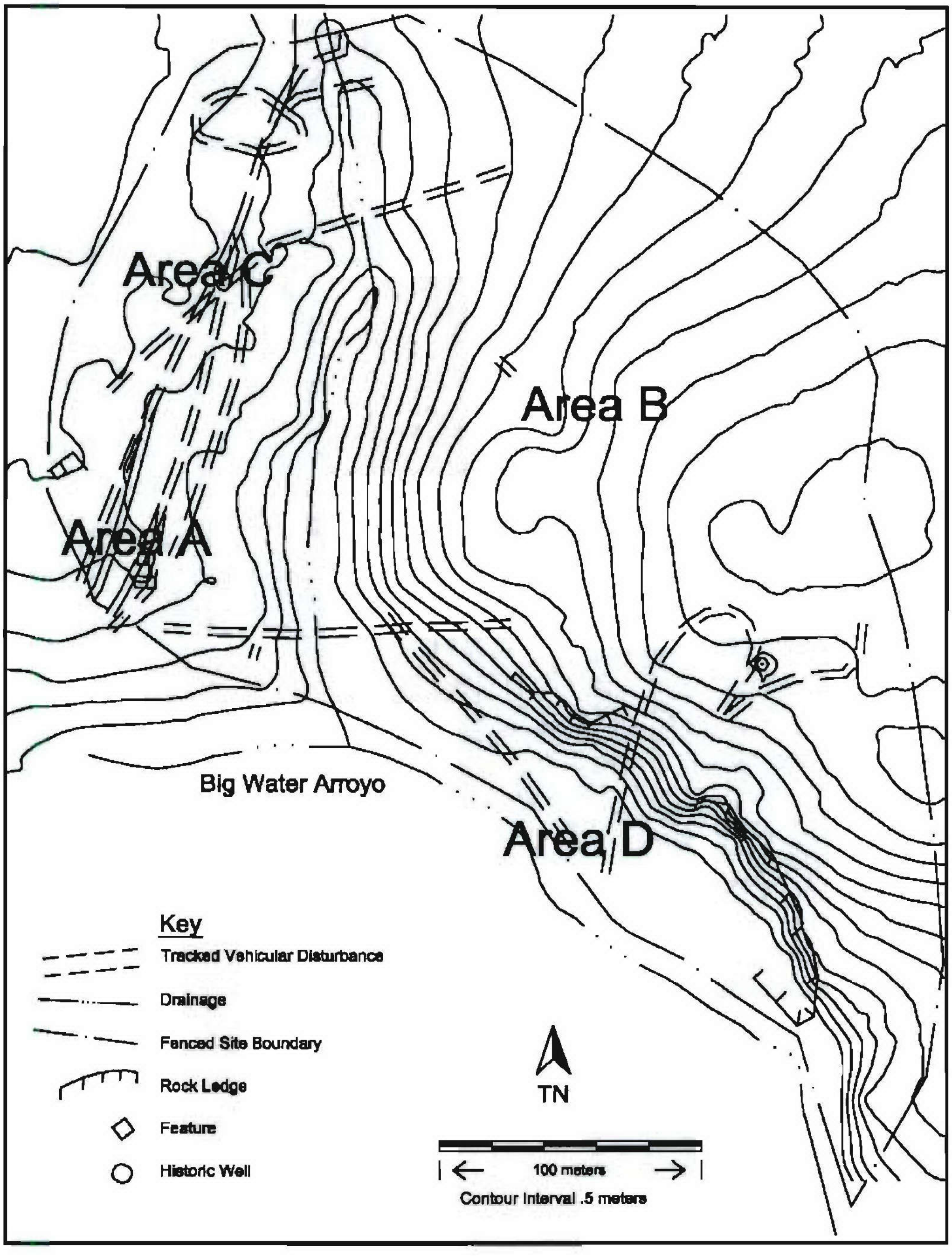


Figure 8.1. Topographic map of site areas, 5LA3421.

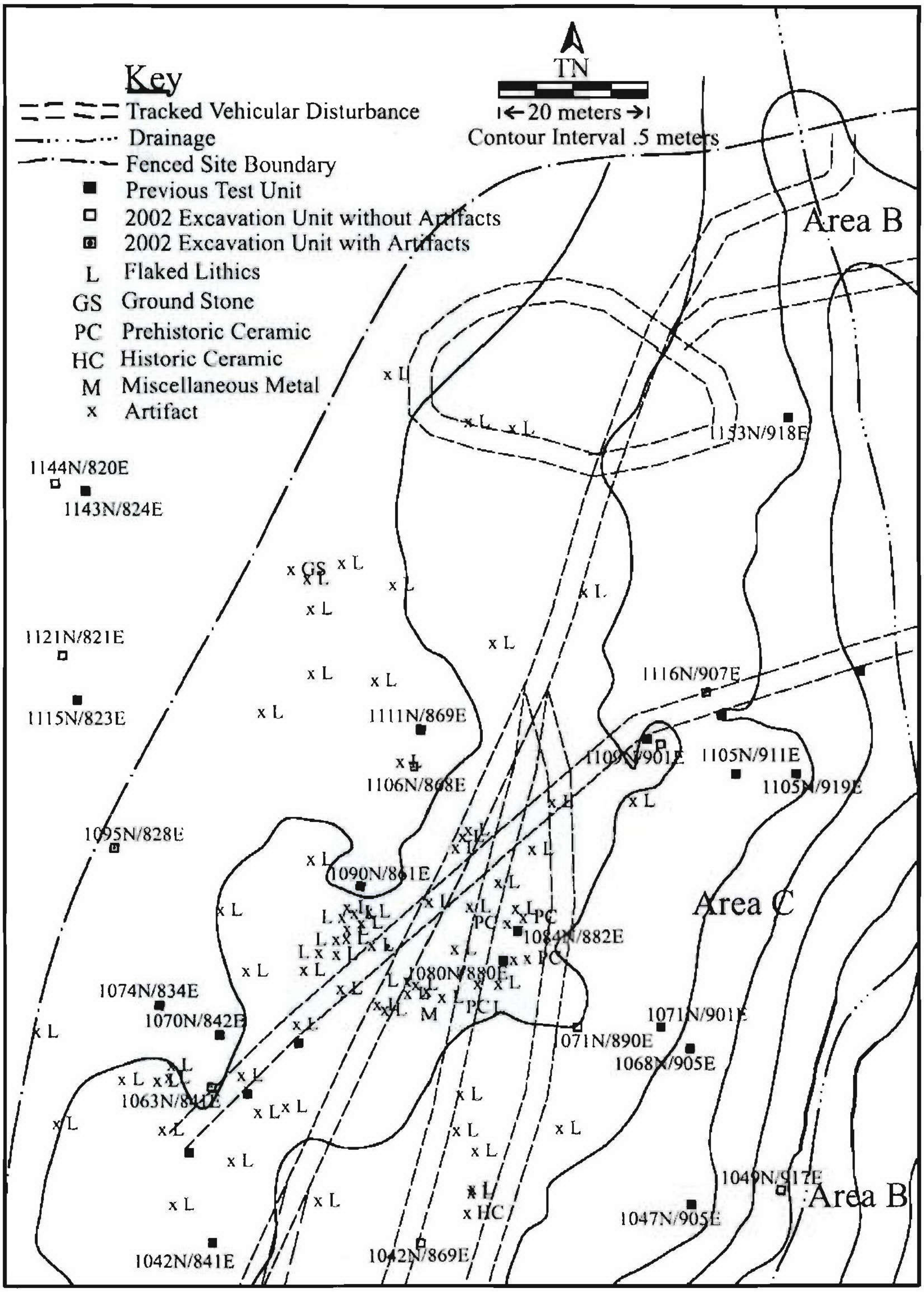


Figure 8.2. Topographic map, Area C.

Table 8.1. Test unit results, Area C.

Test Unit	Size (m)	Layers	Levels	Final Depth (cmbgs)
1042N/841E	1 X 1	3	5	48 - 50
1042N/869E	1 X 1	2	3	23 - 26
1047N/905E	1 X 1	2	4	27 - 35
1049N/917E	1 X 1	1	4	19 - 40
1063N/841E	1 X 1	2	3	20 - 27
1068N/905E	1 X 1	2	3	25 - 35
1070N/842E	1 X 1	2	5	43 - 48
1071N/890E	1 X 1	2	3	25 - 27
1071N/901E	1 X 1	2	4	14 - 34
1074N/834E	1 X 1	2	4	37 - 38
1080N/880E	1 X 1	3	5	44 - 50
1084N/882E	1 X 1	2	4	33 - 36
1090N/861E	1 X 1	2	3	25 - 30
1095N/828E	1 X 1	2	4	31 - 37
1105N/911E	1 X 1	2	4	29 - 37
1105N/919E	1 X 1	2	3	20 - 26
1106N/868E	1 X 1	2	4	32 - 39
1109N/901E	1 X 1	3	4	35 - 39
1111N/869E	1 X 1	2	4	33 - 40
1115N/823E	1 X 1	2	4	30 - 35
1116N/907E	1 X 1	2	3	27 - 32
1121N/821E	1 X 1	2	3	26 - 30
1143N/824E	1 X 1	2	3	21 - 23
1144N/820E	1 X 1	2	3	23 - 26
1153N/918E	1 X 1	2	3	27 - 30

The intent of random sampling in Area C was to sample a large area in a finite amount of time with the assumption that all areas would have an equal probability of being tested. In order to do such, a 100 m x 100 m grid was superimposed over a previously generated field map of Area C using ArcView. This grid was positioned so that its southwest corner corresponded with the northwest corner of the geophysical survey grids in Area A. The grid was composed of 10,000 1 m^2 units, numbered 0 to 100 from south to north and from west to east. These 1 m^2 sections represented possible test unit locations. The selection of test unit locations was determined by consulting a table of five-digit random numbers (Thomas 1976). Of the randomly selected numbers, if the first digit was not a 0 then the selection process would continue until such a number was chosen. The second and third digits would be considered the northing, while the fourth and fifth digits were the easting, in relation to the 100 m^2 random sample grid. For example, the randomly chosen number, 02025, would place a test unit 20 m north and 25 m east of the southwest corner of the grid. An additional grid of 20 m - x - 100 m was added to the north end of the original grid and four more test units were randomly selected in this area using the same method. The grid boundaries did not perfectly match the boundaries of Area C. As a result, four of

the randomly placed test units were located outside and to the west of the site boundary. These test units were retained as part of the sampling strategy and were used to provide comparative results beyond the site boundaries.

The test units were excavated in arbitrary levels within natural layers. As a general rule, two culturally sterile levels had to be excavated before deciding to discontinue the unit excavation. Other reasons for stopping excavation in any unit included reaching bedrock or culturally sterile strata such as the gypsiferous soil identified from test units in Area A adjacent and to the south.

In the following section all twenty-five units are fully described. Although two walls from each unit were drawn, a sample of these is provided in this chapter. Stratigraphy was variable across the Area but many of the units revealed little variance. Therefore, the wall profiles selected for inclusion in this chapter reflect the stratigraphic variability among the units.

Test Unit 1042N/841E Test Unit 1042N/841E was excavated in three layers to a final depth between 48 and 50 cm bgs. Layer 1 consisted of the sod and loose sediments on the surface. The layer (4.5 to 10 cm) was removed in a single level. No artifacts were recovered from this Layer 1. Layer 2 was identified by a structural change and a slight color change in the sediments. Layer 2 was excavated in three levels. One small complete flake was recovered from the top 3 cm of Layer 2 Level 3 and represents the only artifact collected from this unit. Layer 3 was designated near the base of the unit and only one level was removed. A color change and a slight structural change was perceived during excavation. No artifacts were recovered from Layer 3. This unit was terminated after approximately 17 cm of cultural sterile deposits.

Three strata were recognized in the north (south-facing) wall and the west (east-facing) wall profiles. These three strata are illustrated in Figure 8.3 and described below.

Stratum I — Stratum I is a thin (6 to 12 cm) layer of topsoil and loose sediments. The stratum is a pale brown (10YR 6/3), silty clay loam with weak, single grained structure. The lower boundary was clear and smooth. Gravels account for up to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum II — Stratum II is brown (10YR 5/3), silty clay loam that measures 8 to 16 cm thick. The stratum has a moderately developed angular blocky structure. The lower boundary is clear and smooth to wavy. Gravels account for up to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered.

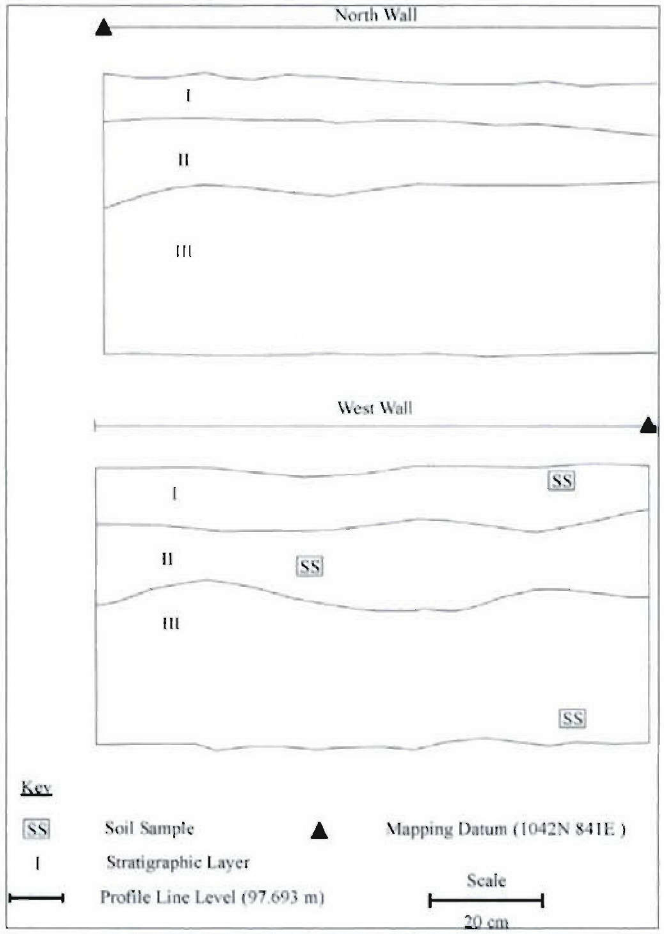


Figure 8.3. 1042N/841E, profiles, Area C.

Stratum III Stratum III is a very pale brown (10YR 7/3), silty clay loam. The lower boundary of this stratum remains concealed. The stratum has a well developed angular to subangular blocky structure. Gravels account for up to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. One small lithic artifact was recovered from the upper 10 to 15 cm of the stratum.

Soil samples were collected from each of the three strata and these were submitted for USDA texture analysis and resistivity results. Samples were analyzed at Colorado Analytical in Brighton, Colorado (Appendix IV). Results of the hydrometer tests on the strata are as follows: Stratum I is a clay loam (20% sand, 49% silt and 31 % clay), Stratum II is a silty clay (13% sand, 40% silt and 47% clay), and Stratum III is a clay loam (23% sand, 38% silt and 39% clay). The lab results, although not an exact match, do not contradict the interpretations of the field archeologists. The data suggest a clay increase in

Stratum II, which is consistent with a "B" soil horizon. The fact that the clay decreases from Stratum II to Stratum III and the increase in sand between these strata might be interpreted as a change in depositional environments between the two strata, perhaps indicative of a trend toward a drier period with more wind-dominated sediments in the upper strata. A second set of samples was submitted to Colorado Analytic to test for the resistivity values. These test results were received in Ohm/Cm. For Stratum I the soils resistivity readings were 984 Ohm/Cm, for Stratum II they were 1745 Ohm/cm and for Stratum III the reading were 1076 Ohm/Cm. The reason to conduct such tests was to generate baseline data from the site so as to determine the natural resistivity values so as to aid in interpreting the geophysical results obtained from the electrical resistance meter. All of these values comfortably lie within the typical resistivity values for loams (500 - 5,000) and for clays (800 - 5,000). The increase in the resistivity values present in Stratum II most likely reflect the increase in clay content suggested by the hydrometer values.

Test Unit 1042N/869E Test Unit 1042N/869E was excavated in two layers to a final depth of between 23 and 26 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (4 to 5 cm) was removed as a single level. Layer 2 exhibited a structural change as well as a lighter color than the previous layer. Two levels were excavated in Layer 2. No artifacts were recovered from any of the three levels and excavation of this unit was terminated.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These strata are described below.

Stratum I — Stratum I is a thin (3 to 6 cm) layer of topsoil and loose sediments. The stratum is a brown (7.5YR 5/4), silt loam. The structure is single grained to a weakly developed subangular blocky (modern compaction). The lower boundary is clear to abrupt and smooth. Gravels account for between 1 to 4 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a pinkish gray (7.5YR 7/2), silty clay loam. The stratum has a well developed subangular blocky structure with pediment size varying. This stratum ranges from 8 to15 cm thick and appears to dip slightly to the east. The lower boundary is clear and smooth. Gravels account for 1 to 10 % of the sediment matrix. Gravels increase to around 10 % near the bottom of the stratum. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum III — Stratum III is a light yellowish brown (10YR 6/4), silty clay loam with a slightly higher sand content then previous stratum. The lower boundary of this stratum remains concealed. The stratum has a well developed subangular blocky structure. The pediments are smaller in size then the previous stratum. A significant increase (40 %) in the number and size of gravels was noted. Gravels range in size from small pebble to cobble sized.

The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1047N/905E Test Unit 1047N/905E was excavated in two layers to a final depth of between 27 and 35 cmbgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (4 to 5 cm) was removed as a single level. No artifacts were recovered. Layer 2 exhibited a structural change and was lighter in color than the previous layer. Three levels were excavated in Layer 2. Two small broken flakes were recovered from Layer 2 Level 2. One flake was recovered from the control sample. The final level was culturally sterile.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These strata are illustrated in Figure 8.4 and are described below.

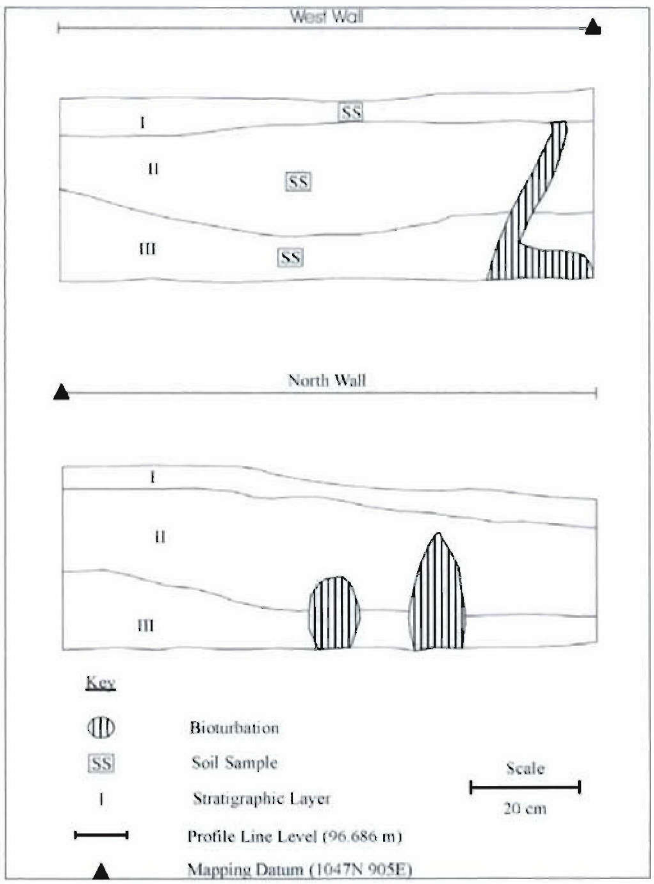


Figure 8.4. 1047N/905E, profiles, Area C.

Stratum I Stratum I is a thin (3 to 7 cm) layer of topsoil and loose sediments. The stratum is a grayish brown (10YR 5/2), silt loam. The structure is single grained to platy. The lower boundary is clear and wavy. Subrounded to

angular gravels account for 5 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a brown (10YR 5/3), silt loam with sand. The stratum has single grained to moderately developed angular blocky structure. This stratum ranges from 10 to 21 cm thick. The lower boundary is diffuse and smooth. Subrounded to angular gravels account for 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. Two lithic artifacts were recovered from this stratum.

Stratum III — Stratum III is a brown (10YR 5/3), sandy silt loam. The lower boundary of this stratum remains concealed. The stratum has a single grained to moderately developed angular blocky soil structure. Calcium carbonate is visible. Angular gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1049N/917E Test Unit 1049N/917E was excavated as one layer with a final depth of between 19 and 40 cm bgs. This unit was positioned on the slope above the drainage along the eastern edge of Area C. Four levels were excavated, but due to the slope, sediments were only removed from the east end for the final two levels. The only recovered material were three indeterminate pieces of bone from Layer 1 Level 2.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are illustrated in Figure 8.5 and are described below.

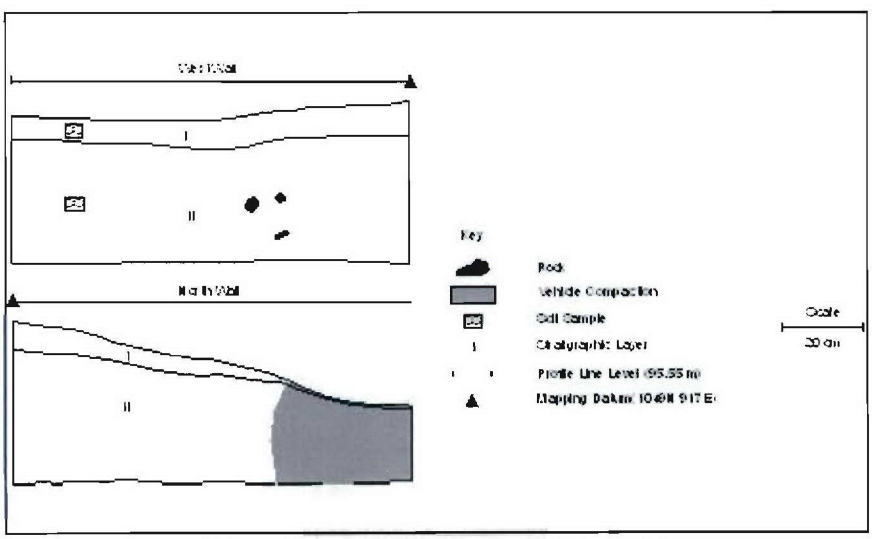


Figure 8.5. 1049N/917E, profile, Area C.

Stratum I	Stratum I is a (1 to 9 cm) layer of topsoil and loose sediments. The stratum is a light pale brown (10YR 6/3), sandy clay loam. The stratum has single grained to weak platy structure. The lower boundary is clear and smooth. Gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum II	Stratum II is a grayish brown (10YR 5/2), clay loam. The stratum has a well developed subangular blocky structure. The lower boundary of this stratum remains concealed. Sandstone gravels account for 4 to 8 % of the matrix with the amount increasing with depth. The sediments react violently to hydrochloric acid. Natural inclusions include gypsum and iron oxidation. No artifacts were recovered from this stratum.

Test Unit 1063N/841E Test Unit 1063N/841E was excavated in two layers to a final depth between 20 and 27 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (3 to 6 cm) was removed as a single level. No artifacts were recovered from these sediments. Layer 2 was identified by a structural change and a difference in color. Layer 2 was excavated in two levels. The first level contained one broken flake, one piece of metal, and one piece of indeterminate bone. All were recovered from the control sample. Layer 2 Level 2 was culturally sterile. This unit was terminated after at least10 cm of sterile fill.

Two strata were recognized in the north (south-facing) wall and the west (east-facing) wall profiles. These two strata are described below.

Stratum I	Stratum I is a thin (2 to 8 cm) layer of topsoil and loose sediments. The stratum is a brown (10YR 4/3), silt loam and has a single grained to platy structure. The lower boundary is clear and wavy. No gravels are present. The sediments react extremely violently to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum II	Stratum II is a yellow brown (10YR 5/4), silty clay loam. The lower boundary of this stratum remains concealed. The stratum has a angular blocky to platy structure. Subrounded gravels account for 2 % of the sediment matrix. The sediments react extremely violently to hydrochloric acid. One lithic artifact, one piece of metal, and a small piece of bone were recovered from the upper 10 cm of transition from Stratum I to Stratum II.

Test Unit 1068N/905E Test Unit 1068N/905E was excavated in two layers to a final depth of between 25 and 35 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. Two levels were excavated. This layer was 15 to 20 cm thick. Two small broken flakes and one piece of metal were collected from the control sample from Layer 1 Level 2. Layer 2 exhibited a structural change as well as a color change from the previous layer. One level was excavated in Layer 2. A charcoal sample (less than 0.1 gram)

was collected from control sample in this level.

Four strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These four strata are described below.

Stratum I — Stratum I is a thin (4 to 8 cm) layer of topsoil and loose sediments. The stratum is a brown to dark brown (7.5 YR 5/2 to 4/2), sandy to silty clay loam. The soil structure is platy to a weak blocky. The lower boundary is clear and smooth. No gravels are present. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a gray (5 YR 5/1), silty clay. The stratum has a moderate developed angular blocky structure. This stratum ranges from 3 to 9 cm thick. The lower boundary is abrupt and smooth. No gravels are present. The sediments react violently to hydrochloric acid. Two lithic artifacts and one metal fragment were recovered from the transition to Stratum III.

Stratum III — Stratum III is a pinkish gray (7.5 YR 7/2 to 6/2), silty clay loam. The stratum has a moderately developed subangular blocky structure. This stratum ranges from 10 to 18 cm thick. The lower boundary is abrupt and smooth. No gravels are present. The sediments react violently to hydrochloric acid. Two lithic artifacts and one metal fragment were recovered from the transition to Stratum II.

Stratum IV — Stratum IV is a pale yellow (2.5 Y 7/4), silty clay loam. The stratum has a weak to moderately developed subangular blocky structure. The lower boundary of this stratum remains concealed. No gravels are present. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Test Unit 1070N/842E Test Unit 1070N/842E was excavated in two layers to a final depth between 43 to 48 cmbgs. Layer 1 consisted of sod and loose sediments from the surface. The layer (4 to 7.5 cm) was removed as a single level. One miscellaneous piece of metal was recovered from the sediments. Layer 2 was identified by a structural change. Layer 2 was excavated in four levels. The first three levels were culturally sterile but Layer 2 Level 4 had one miscellaneous piece of metal in the control sample. Its presence suggests possible contamination falling from Layer 1 during collection. There was no other evidence that cultural material extended to this depth. Discounting the presence of this metal artifact, Layer 2 consisted of approximately 40 cm of sterile fill.

Three strata were recognized in the north (south-facing) wall and the west (east-facing) wall profiles. These three strata are described below.

Stratum I — Stratum I is a thin (4 to 11 cm) layer of topsoil and loose sediments. The

stratum is a pale brown (10YR 6/3), silt with sand and has a single grained to weak platy structure (modern compaction). The lower boundary was abrupt and smooth. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. One piece of miscellaneous metal was recovered.

Stratum II — Stratum II is brown (10YR 5/3), silty clay loam that measures 17 to 23 cm thick. The stratum has an angular blocky structure. The lower boundary is gradual and slightly undulating. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum III — Stratum III is a brown (10YR 4/3), silty clay loam. The lower boundary of this stratum remains concealed. The stratum has a angular blocky structure but the pediments have a smaller average size than Stratum II. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Test Unit 1071N/890E Test Unit 1071N/890E was excavated in two layers to a final depth of between 25 and 27 cm bgs. Layer 1 was removed as a single level. Layer 1 consisted of the removal of a thin (7 to 8 cm) layer of sod and loose sediments exposed on the surface. No artifacts were recovered. Layer 2 was lighter in color and represents a more well developed soil. Two levels were excavated in Layer 2. Excavation was terminated after all three levels were culturally sterile. Bioturbation was obvious in all levels.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These three strata are illustrated in Figure 8.6 and described below.

Stratum I — Stratum I is a thin (3 to 6 cm) layer of topsoil and loose sediments. The stratum is a light brown (7.5YR 6/4), silty sand. The structure is single grained to weakly developed. The lower boundary is clear to gradual and smooth. Sandstone gravels account for about 1 to 6 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a light brownish gray (2.5Y 6/2), silty loam with fine sand. The stratum has a moderately developed subangular blocky structure. This stratum thickness fluctuates from 1 to 20 cm thick. The lower boundary is clear and wavy. Sandstone gravels account for about 1 to 3 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

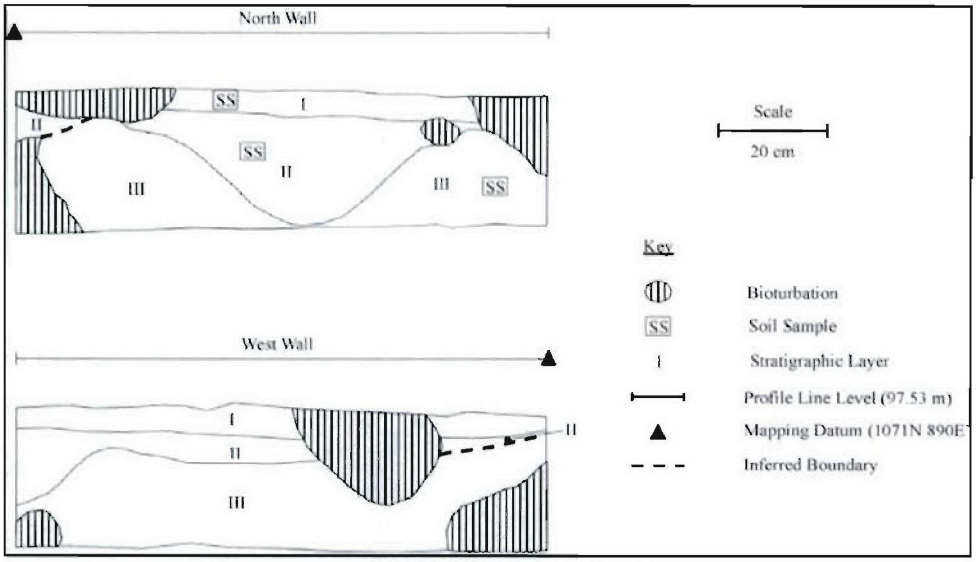


Figure 8.6. 1071N/890E, profiles, Area C.

Stratum III Stratum III is a pale yellow (2.5Y 7/4), silty loam with fine sand. The lower boundary remains concealed. The stratum has a moderately developed subangular to angular blocky structure. Sandstone gravels account for about 1 to 4 % of the sediment matrix. Inclusions of medium to coarse sand and gypsum are present. The sediments are almost powdery at times. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1071N/901E Test Unit 1071N/901E was excavated in two layers to a final depth between 14 and 34 cm bgs. Layer 1 consisted of the sod and loose sediments on the surface. Two levels were excavated. Due to the slope of the unit, sediments were only removed from three corners in Level 1. One small broken flake was recovered from the control sample in Layer 1 Level 1. Layer 1 Level 2 was only excavated in the southeast corner. Level 1 was a thin (3 to 5 cm) layer. Layer 2 was identified as a structural change as well as a color change. Two levels were removed as Layer 2. One small broken flake and one piece of metal were recovered from the control sample in Layer 2 Level 1. The final 10 cm level was culturally sterile. Bioturbation was extensive in this unit.

Two strata were recognized in the north (south-facing) wall and the west (east-facing) wall profiles. These two strata are described below.

Stratum I Stratum I is a (6 to 14 cm) layer of topsoil and loose sediments. The stratum is a yellow brown (10 YR 5/4), sandy silt with a single grained to weak blocky structure. The lower boundary is clear to gradual and wavy.

Sandstone gravels account for 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifacts was recovered from this stratum. Another lithic artifact and a piece of metal were recovered from the transition to Stratum II.

Stratum II — Stratum II is light yellowish brown (10 YR 6/4), silty loam. The lower boundary of this stratum remains concealed. The stratum has a moderately developed angular blocky structure. No gravels were noted. The sediments react violently to hydrochloric acid. One lithic artifact and one metal artifact were recovered from the transition with Stratum I. At least the last 10 cm were culturally sterile.

Test Unit 1074N/834E Test Unit 1074N/834E was excavated in two layers to a final depth of between 37 and 38 cmbgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (7 to 8 cm) was removed as a single level. One broken flake was recovered from this layer. Layer 2 exhibited a structural change as well as a color change from the previous layer. Three levels were excavated in Layer 2. Layer 2 Level 1 was a culturally sterile level. Layer 2 Level 2 had one broken flake in the upper 2 cm which is roughly 18 to 20 cmbgs. The final level, Layer 2 Level 3 was culturally sterile. The unit was terminated after approximately 18 cm of sterile fill.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are described below.

Stratum I — Stratum I is a thin (7 to 9 cm) layer of topsoil and loose sediments. The stratum is a brown (10YR 5/3), silty sand. The stratum has a single grained to a weak blocky structure. The lower boundary is clear and smooth. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifact was recovered.

Stratum II — Stratum II is a dark grayish brown (10YR 4/2), silty clay loam. The stratum has a well developed angular blocky structure. The upper 14 to 16 cm has been compacted by tracked vehicular traffic. The lower boundary of this stratum remains concealed. Sandstone gravels account for 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from the upper 11 to 13 cm of this stratum.

Test Unit 1080N/880E Test Unit 1080N/880E was excavated in three layers to a final depth of between 44 and 50 cm bgs. The first layer consisted of the excavation of the sod and loose sediments from the surface. Layer 1 was removed as a 7 to 10 cm thick level. One broken flake was recovered. Layer 2 had a more developed structure and was lighter in color. Three levels were excavated in Layer 2. One level was excavated as Layer 3. A distinction between Layer 2 and Layer 3 was made based on a perceived soil change. Excavation was terminated after 40 cm of sterile deposits. This unit represents the only non-randomly placed

test unit in Area C. It was centered in an area where prehistoric ceramics had been found on the surface; however, no ceramics were recovered from the unit.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These three strata are described below.

Stratum I — Stratum I is a thin (3 to 10 cm) layer of topsoil and loose sediments. The stratum is a yellowish brown (10YR 5/4), silty clay loam. The structure is a weakly developed subangular to angular blocky structure. The lower boundary is clear and smooth. No gravels are present. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from the transition with the lower stratum.

Stratum II — Stratum II is a pale brown (10YR 6/3), silty clay loam. The stratum has a moderately developed angular blocky structure. This stratum ranges from 27 to 33 cm thick. The lower boundary is clear and smooth. No gravels are present. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from the transition with the upper stratum.

Stratum III — Stratum III is a very pale brown (10YR 7/3), silty clay loam. The stratum has a moderately developed angular blocky structure. The lower boundary of this stratum remains concealed. No gravels are present. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Test Unit 1084N/882E Test Unit 1084N/882E was excavated in two layers to a final depth of between 33 and 36 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This layer (3 to 8 cm) was removed as a single level. Six prehistoric ceramics were recovered, one of which was recovered from control sample. Layer 2 exhibited a structural change as well as a color change from the previous layer. Three levels were excavated in Layer 2. At the very top of Layer 2 Level 1, one additional ceramic was recovered. Excavation was terminated after the next two levels were culturally sterile.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are described below.

Stratum I — Stratum I is a thin (5 to 8 cm) layer of topsoil and loose sediments. The stratum is a brown (10YR 5/3), silt loam. The structure is single grained to weak blocky. The lower boundary is clear and smooth. Gravels account for 0 to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. Ceramics were recovered from this stratum.

Stratum II — Stratum II is a pale brown (10YR 6/3), sandy clay loam. The stratum has a well developed angular blocky structure. The upper 14 to 16 cm has been

compacted by tracked vehicular traffic. Gravels account for 0 to1 % of the sediment matrix. The sediments react violently to hydrochloric acid. One ceramic was recovered at the transition of this stratum with Stratum I. The lower boundary of this stratum remains concealed.

Test Unit 1090N/861E Test Unit 1090N/861E was excavated in two layers to a final depth between 25 and 30 cmbgs. Layer 1 consisted of the sod and loose sediments on the surface. The layer (5 to 10 cm) was removed in a single level. No artifacts were recovered from Layer 1. Layer 2 was identified primarily as a structural change. Two levels were removed as Layer 2. One small broken flake and one piece of indeterminate bone was recovered from the control sample in Layer 2 Level 1 and represent the only artifacts collected from this unit. The last excavated level was culturally sterile.

Three strata were recognized in the north (south-facing) wall and the west (east-facing) wall profiles. These three strata are described below.

Stratum I — Stratum I is a thin (2 to 7 cm) layer of topsoil and loose sediments. The stratum is a brown (10YR 5/3), silty clay with weakly developed structure. The lower boundary is abrupt to clear and smooth. No gravels are present. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum II — Stratum II is brown (10YR 5/3), silty clay that measures 8 to 14 cm thick. The stratum has a weak to moderately developed subangular blocky to columnar structure. The lower boundary is clear and smooth. No gravels are present. The sediments react violently to hydrochloric acid. One lithic artifact and one piece of bone were recovered from this stratum.

Stratum III — Stratum III is a very pale brown (10YR 6/3), silty clay. The lower boundary of this stratum remains concealed. The stratum has a moderately developed angular blocky structure. The pediments are noticeably smaller than those in Stratum II. No gravels were noted. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Test Unit 1095N/828E Test Unit 1095N/828E was excavated in two layers to a final depth of between 31 and 37 cmbgs. Layer 1 was removed as a single level. Layer 1 consisted of the removal of a thin (5 to 7 cm) layer of sod and loose sediments exposed on the surface. No artifacts were recovered. Layer 2 was more compact with a slight color change from the previous layer. Three levels were excavated in Layer 2. Six small fragments from one flaked tool were found in the control sample of Layer 2 Level 1 and one complete flake was recovered from Layer 2 level 2. Excavation was terminated at Test Unit 1095N/828E after Layer 2 Level 3 failed to produce any cultural material.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These three strata are described below.

Stratum I — Stratum I is a thin (5 to 6 cm) layer of topsoil and loose sediments. The stratum is a brown (7.5YR 5/4), silt loam. The structure is single grained to a weakly developed subangular blocky structure with some modern (platy) compaction. The lower boundary is clear and smooth. Subrounded gravels account for about 1 to 5 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a light brown (7.5YR 6/4), silty clay loam that measures 15 to 17 cm thick. The stratum has a angular blocky to columnar structure. The lower boundary is gradual and smooth. Subrounded gravels account for about 1 to 3 % of the sediment matrix. The sediments react violently to hydrochloric acid. Two lithic artifacts were recovered, with one occurring in the upper half of this stratum and the other recovered from the transition between Strata II and III.

Stratum III — Stratum III is a pinkish gray (7.5YR 7/2), silty clay loam. The lower boundary of this stratum remains concealed. The stratum has a angular blocky to columnar structure. Subrounded gravels account for about 1 to 3 % of the sediment matrix. The sediments react violently to hydrochloric acid. One artifact occurred at the transition between Strata II and III.

Test Unit 1105N/911E Test Unit 1105N/911E was excavated in two layers to a final depth of between 29 and 37 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (5 to 7 cm) was removed as a single level. No artifacts were recovered. Layer 2 exhibited a structural change and was slightly lighter in color than the previous layer. Three levels were excavated in Layer 2. One small broken flake and a charcoal sample (less than 0.1 gram) were collected from the control sample in Layer 2 Level 2. The next level was culturally sterile and excavation was terminated at this point.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are illustrated in Figure 8.7 and are described below.

Stratum I — Stratum I is a (3 to 10 cm) layer of topsoil and loose sediments. The stratum is a light yellowish brown (10YR 6/4), sandy loam. The structure is single grained. The lower boundary is clear and wavy. Rounded to subrounded gravels account for 5 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum. Charcoal was noted but was not collected.

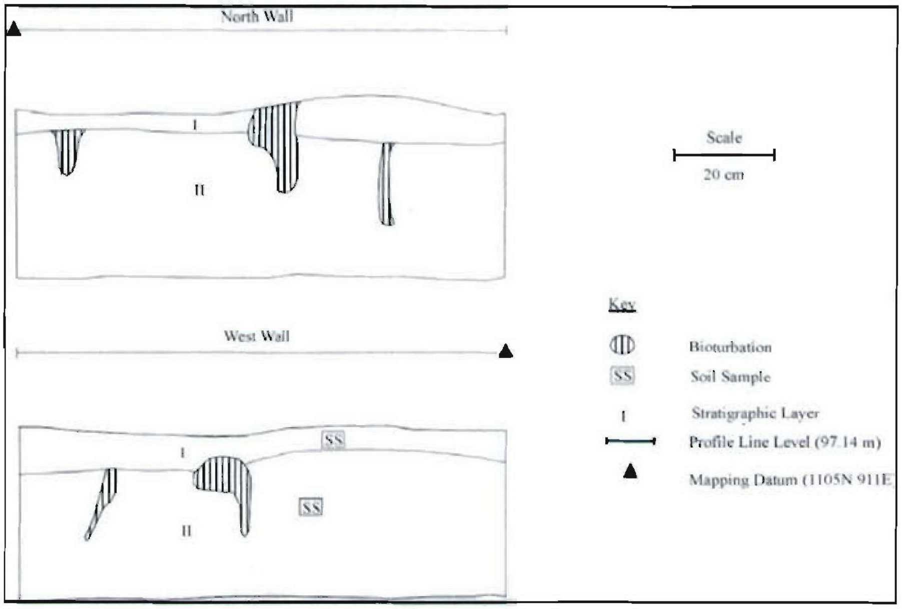


Figure 8.7. 1105N/911E, profiles, Area C.

Stratum II Stratum II is a yellowish brown (10YR 5/4), sandy loam. The stratum has a single grained to moderately developed angular blocky structure. The lower boundary of this stratum remains concealed. Sandstone gravels account for 2 % of the sediment matrix with the amount decreasing with depth. The sediments react violently to hydrochloric acid. One lithic artifact and a charcoal sample were recovered from the upper half of this stratum. The next 10 cm was culturally sterile.

Test Unit 1105N/919E Test Unit 1105N/919E was excavated in two layers to a final depth of between 20 and 26 cmbgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (3 to 6 cm) was removed as a single level. Layer 2 exhibited a structural change and was darker in color than the previous layer. Two levels were excavated in Layer 2. One small broken flake was recovered from Layer 2 Level 1 and one piece of miscellaneous metal was recovered from Layer 2 Level 2. Both artifacts were collected from the control sample.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These strata are described below.

Stratum I Stratum I is a thin (3 to 9 cm) layer of topsoil and loose sediments. The stratum is a yellowish brown (10YR 5/4), silt loam. The structure is single grained to platy. The lower boundary is clear and wavy. Subrounded to rounded gravels account for 5 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II Stratum II is a brown (10YR 5/3), silty clay loam. The stratum has platy to moderately developed angular blocky structure. This stratum ranges from 8 to 20 cm thick where Stratum III is exposed in the northwest corner of the unit. This stratum extends all the way to the base of the unit elsewhere, indicating that the maximum thickness of this stratum is over 20 cm. The lower boundary, where visible, is diffuse and wavy. Angular sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifact and one piece of metal were recovered from this stratum.

Stratum III Stratum III is a yellow brown (10YR 5/4), silty clay loam. This stratum is only exposed in the northwest corner of the unit. The lower boundary of this stratum remains concealed. The stratum has a platy to moderately developed angular blocky structure. Calcium carbonate is visible. No gravels are present. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1106N/868E Test Unit 1106N/868E was excavated in two layers to a final depth of between 32 and 39 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (4 to 6 cm) was removed as a single level. Layer 2 exhibited a structural change as well as a color change from the previous layer. Three levels were excavated in Layer 2. No artifacts were recovered from any of the four levels and excavation of this unit was terminated.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These strata are described below.

Stratum I Stratum I is a thin (3 to 10 cm) layer of topsoil and loose sediments. The stratum is a brown (10YR 5/3), silty clay loam. The structure is single grained to weak subangular blocky. The lower boundary is abrupt and smooth. No gravels were observed. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II Stratum II is a pale brown (10YR 6/3), silty clay loam. The stratum has a moderate to well developed angular blocky structure. This stratum ranges from 17 to 25 cm thick. The lower boundary is gradual and smooth. Sandstone gravels account for 0 to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum III Stratum III is a light yellowish brown (10YR 6/4), silty clay with sand. The top 8 to 11 cm were exposed. The stratum has a well developed angular blocky structure. Sandstone gravels increased to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found

in this stratum.

Test Unit 1109N/901E Test Unit 1109N/901E was excavated in three layers to a final depth of between 35 and 39 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (5 to 7 cm) was removed as a single level. Layer 2 exhibited a structural change and was darker in color than the previous layer. Two levels were excavated in Layer 2. One level was removed as Layer 3. The layer change was based on a structural change as well as a change in color. No artifacts were recovered from any of the four levels and excavation of this unit was terminated. Compaction from tracked vehicular traffic was visible in southwest corner to a depth of 15 cm below present ground surface.

Three strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These strata are described below.

Stratum I — Stratum I is a thin (3 to 10 cm) layer of topsoil and loose sediments. The stratum is a pale brown (10YR 6/3) silt with sand. The structure is single grained to weak platy. The lower boundary is clear and smooth. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a brown (10YR 4/3), silty clay loam. The stratum has a moderate to well developed angular blocky structure. This stratum ranges from 19 to 25 cm thick. The lower boundary is clear and smooth. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum III — Stratum III is a yellow brown (10YR 5/4), silty clay loam. The lower boundary of this stratum remains concealed. The stratum has a massive soil structure. The stratum appears to represent a weathered subsoil with visible calcium carbonate, iron, and gypsum mottling. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1111N/869E Test Unit 1111N/869E was excavated in two layers to a final depth of between 33 and 40 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This layer (3 to 10 cm) was removed as a single level. Layer 2 exhibited a structural change as well as a color change from the previous layer. Three levels were excavated in Layer 2. One complete flake was collected from the first level. No artifacts were recovered from the final two levels and excavation of this unit was terminated. Compaction from tracked vehicular traffic was evident along the south edge of the unit to a depth of 23 cm bgs

Three strata were recognized in the south (north-facing) wall and in the west (east-

facing) wall profiles. These three strata are illustrated in Figure 8.8 and are described below.

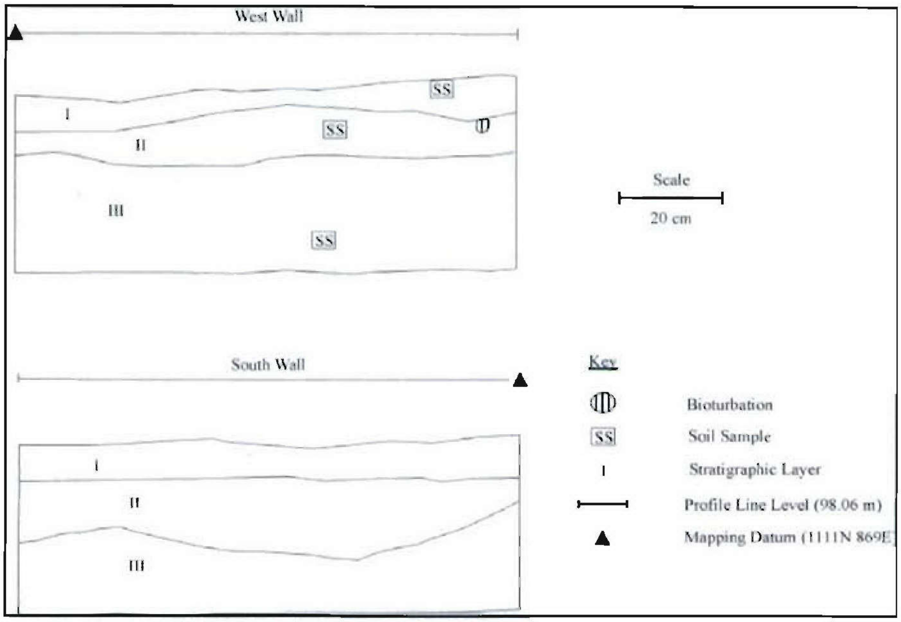


Figure 8.8. 1111N/869E, profiles, Area C.

Stratum I — Stratum I is a thin (3 to 8 cm) layer of topsoil and loose sediments. The stratum is a brown (10YR 5/3), silty clay loam. The structure is granular to a weakly developed blocky. The lower boundary is clear and wavy to smooth. Gravels account for 0 to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a pale brown (10YR 6/3) to brown (10YR 5/3), silty clay loam. The stratum has a moderately developed angular blocky structure. This stratum ranges from 4 to 16 cm thick. The lower boundary is clear to gradual and smooth. Gravels account for 0 to 2% of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from this stratum.

Stratum III — Stratum III is a pale brown (10YR 6/3), silty clay loam with sand. The lower boundary of this stratum remains concealed. The stratum has a well developed angular blocky structure. Gravels account for 0 to 2 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1115N/823E Test Unit 1115N/823E was excavated in two layers to a final depth of between 30 and 35 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (3 to 7 cm) was removed as a single level. No

artifacts were recovered. Layer 2 exhibited a structural change as well as a color change from the previous layer. Three levels were excavated in Layer 2. Excavations were terminated after two sterile levels. Compaction from tracked vehicular traffic was evident during the excavation of Layer 2 and was extensive enough to be visible in the wall profiles. The depth of compaction varied from between 17 and 27 cmbgs. One broken flake was recovered from this unit at the very top of Layer 2 Level 1, which is at the transition between the upper and lower soil strata.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are illustrated in Figure 8.9 and are described below.

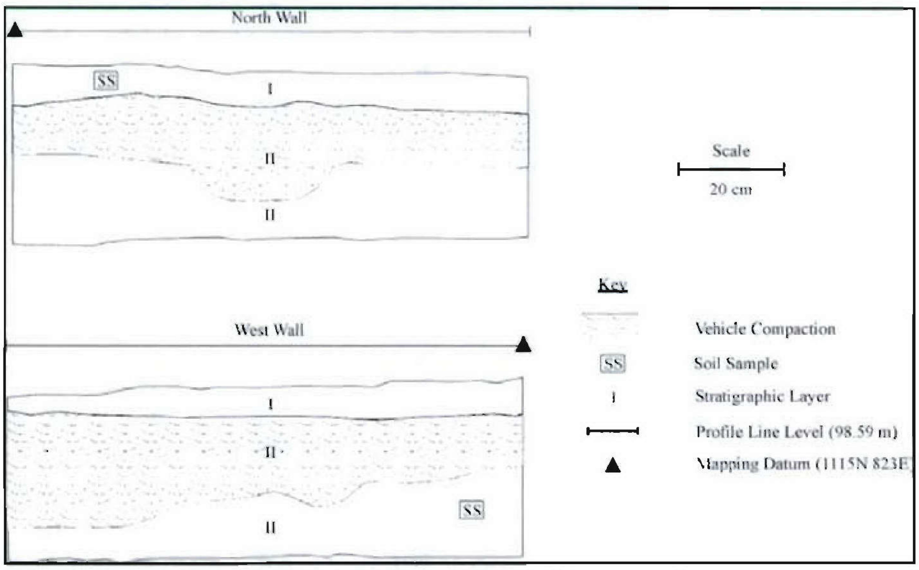


Figure 8.9. 1115N/823E, profiles, Area C.

Stratum I — Stratum I is a thin (3 to 8 cm) layer of topsoil and loose sediments. The stratum is a yellow brown (10YR 5/4), silt with sand. The structure is single grained to platy (modern compaction). The lower boundary is abrupt and smooth. Gravels account for less than 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II — Stratum II is a brown (10YR 5/3), silty clay loam. The stratum has a well developed angular blocky structure. The upper 10 to 22 cm has been compacted by tracked vehicular traffic. The lower boundary of this stratum remains concealed. Gravels account for less than 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifact was found at the top of this stratum near the transition from Stratum I.

Test Unit 1116N/907E Test Unit 1116N/907E was excavated in two layers to a final depth of between 27 and 32 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This layer (5 to 10 cm) was removed as a single level. No artifacts were recovered. Layer 2 exhibited a structural change from the previous layer. Two levels were excavated in Layer 2. One small broken flake was recovered from the control sample in Layer 2 Level 1. The next level was culturally sterile and excavation was terminated at this point.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are described below.

Stratum I — Stratum I is a thin (5 to 7 cm) layer of topsoil and loose sediments. The stratum is a light brownish gray (10YR 6/2) to a grayish brown (10 YR 5/2), sandy clay loam. The structure is single grained to weakly blocky. The lower boundary is abrupt and smooth. Gravels account for 0 to 2 % of the sediment matrix and are well sorted. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.

Stratum II — Stratum II is a pale brown (10YR 6/3) to a brown (10 YR 5/3), sandy clay loam. The stratum has a moderately developed angular blocky to columnar structure. Pediment size decreases with depth. The lower boundary remains concealed. No gravels are present. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from the upper 15 cm of this stratum. The next 10 cm was culturally sterile.

Test Unit 1121N/821E Test Unit 1121N/821E was excavated in two layers to a final depth of between 26 and 30 cmbgs. Layer 1 was removed as a single level. Layer 1 consisted of the removal of a thin (4 to 9 cm) layer of sod and loose sediments exposed on the surface. No artifacts were recovered. Layer 2 was more compact with a slight color change from the previous layer. Two levels were excavated in Layer 2. Compaction from tracked vehicular traffic was present but not as extensive as the impact in nearby Test Unit 1115N/823E. The compaction was noticeable across the center of the unit. Tracked vehicular compaction was only evident in the first level of Layer 2. Compaction was not easily distinguished in the wall profile. The estimated depth of compaction varied from 10 to 15 cm bgs. Excavation was terminated at Test Unit 1121N/821E after three culturally sterile levels were excavated.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are described below.

Stratum I — Stratum I is a thin (4 to 9 cm) layer of topsoil and loose sediments. The stratum is a yellow brown (10YR 5/4), silt with sand. The structure is single grained to platy (modern compaction). The lower boundary is abrupt and smooth. Sandstone gravels account for about 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II	Stratum II is a brown (10YR 5/3), silty clay loam. The stratum has a angular blocky structure. The upper 5 to 10 cm is compacted by tracked vehicular traffic. The lower boundary of this stratum remains concealed. Sandstone gravels account for about 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Test Unit 1143N/824E Test Unit 1143N/824E was excavated in two layers to a final depth of between 21 and 23 cmbgs. The first layer consisted of the excavation of the sod and loose sediments from the surface. Layer 1 was removed as one thin (3 to 5 cm), single level. No artifacts were recovered. Layer 2 had a more developed structure and was also darker in color. Two levels were excavated in layer 2. A single flake was recovered from the control sample in Layer 2, Level 2. Compaction from tracked vehicular traffic was noted across the eastern half of the unit but only extended down a few centimeters to the top of Layer 2. Compaction was not visible in the wall profiles. Excavation was terminated after three culturally sterile levels were excavated. The lone artifact was not discovered until the control samples were processed.

Two strata were recognized in the north (south-facing)wall and in the west (east-facing) wall profiles. These two strata are described below.

Stratum I	Stratum I is a thin (3 to 5 cm) layer of topsoil and loose sediments. The stratum is a light brown (7.5YR 6/4), silt loam. The structure is single grained to a weak subangular blocky structure with some modern compaction. Compaction was only noticed on the east half of the unit. The lower boundary is abrupt and smooth. Subrounded gravels account for about 1 to 5 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were found in this stratum.

Stratum II	Stratum II is a pinkish gray (7.5YR 7/2), silty clay loam. The stratum has a well developed subangular to angular blocky structure. Compaction dissipates at very top of layer. The lower boundary of this stratum remains concealed. Subrounded gravels account for about 1 to 5 % of the sediment matrix. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from this stratum.

Test Unit 1144N/820E Test Unit 1144N/820E was excavated in two layers to a final depth of between 23 and 26 cm bgs. Layer 1 consisted of the removal of the sod and loose sediments from the surface. This thin layer (2 to 5 cm) was removed as a single level. No artifacts were recovered. Layer 2 exhibited a structural change as well as a color change from the previous layer. Two levels were excavated in Layer 2. Excavation was terminated after three sterile levels. Compaction from tracked vehicular traffic was noticed along the south edge and the east half of the unit during the excavation of Layer 2. The compaction was no longer apparent by the base of the unit. The compaction was not extensive enough to be visible in the wall profiles. The depth of compaction on the east half of the unit was at least 20 to 24 cm below

ground surface. One charcoal sample was collected from the control sample in Layer 2 Level 2. This sample was very small (< 0.1 g) and was not sent for processing.

Two strata were recognized in the north (south-facing) wall and in the west (east-facing) wall profiles. These two strata are described below.

Stratum I	Stratum I is a thin (6 to 8 cm) layer of topsoil and loose sediments. The stratum is a yellow brown (10YR 5/4), silt with sand. The structure is single grained to platy (modern compaction). The lower boundary is abrupt and smooth. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. No artifacts were recovered.
Stratum II	Stratum II is a brown (10YR 5/3), silty clay loam. The stratum has an angular blocky structure with small pediments. The upper 14 to 16 cm has been compacted by tracked vehicular traffic. The lower boundary remains concealed. Sandstone gravels account for 1 % of the sediment matrix. The sediments react violently to hydrochloric acid. A small sample of charcoal was collected from the stratum.

Test Unit 1153N/918E Test Unit 1153N/918E was excavated in two layers to a final depth between 27 and 30 cm bgs. Layer 1 consisted of the sod and loose sediments on the surface. This layer (8 to 11 cm) was removed in a single level. No artifacts were recovered from Layer 1. Layer 2 was identified primarily as a structural change. Two levels were removed as Layer 2. One small broken flake was recovered from the control sample in Layer 2 Level 2 and represents the only artifact collected from this unit.

Three strata were recognized in the north (south-facing) wall and the west (east-facing) wall profiles. These three strata are described below.

Stratum I	Stratum I is a (5 to 10 cm) layer of topsoil and loose sediments. The stratum is a pale brown (10YR 6/3) to a brown (10 YR 5/3), sandy clay loam with weak, single grained structure. The lower boundary is abrupt and smooth. No gravels are present. The sediments react violently to hydrochloric acid. No artifacts were recovered from this stratum.
Stratum II	Stratum II is brown (10YR 5/3), sandy clay loam. This stratum ranges from 4 to 16 cm thick. The stratum has a moderate to well developed subangular blocky structure. Gravels account for 0 to 2 % of the sediment matrix and are well sorted. The sediments react violently to hydrochloric acid. One lithic artifact was recovered from this stratum.
Stratum III	Stratum III is a very pale brown (10YR 6/3), silty clay. The stratum has a moderately developed angular blocky structure. The peds are noticeably smaller than in Stratum II. No gravels were noted. The sediments react

violently to hydrochloric acid. The lower boundary of this stratum remains concealed. No artifacts were recovered from this stratum.

Material Culture

Eighteen (72 %) of the twenty-five test units contained cultural material and another one contained a few pieces of bone (Table 8.2). Six pieces of unidentified metal were recovered in four of the eighteen units. These were the only historic artifacts recovered from testing in this Area. Twenty flakes, fragments of one flake tool and seven prehistoric sherds were recovered subsurface. This is an insignificant number of artifacts for the amount of testing conducted. Artifacts occurred about 1 per square meter in Area C.

The material culture of Area C consists of both historic and prehistoric artifacts along with a small amount of non-human faunal remains.

Table 8.2. Cultural materials recovered from test units, Area C.

Test Unit	Material Culture
1042N/841E	1 complete flake
1042N/869E	No artifacts
1047N/905E	2 broken flakes
1049N/917E	3 pieces of bone
1063N/841E	1 broken flake, 1 piece of metal, 1 piece of bone
1068N/905E	2 broken flakes, 1 piece of metal
1070N/842E	2 pieces of metal
1071N/890E	No artifacts
1071N/901E	2 broken flakes, 1 piece of metal
1074N/834E	2 broken flakes
1080N/880E	1 broken flake
1084N/882E	7 prehistoric ceramics
1090N/861E	1 broken flake, 1 piece of bone
1095N/828E	1 complete flake, 1 flake tool (6 pieces)
1105N/911E	1 broken flake
1105N/919E	1 broken flake, 1 piece of metal
1106N/868E	No artifacts
1109N/901E	No artifacts
1111N/869E	1 complete flake
1115N/823E	1 broken flake
1116N/907E	1 broken flake
1121N/821E	No artifacts
1143N/824E	1 broken flake
1144N/820E	No artifacts
1153N/918E	1 broken flake

Faunal Remains

Five fragments of bone were recovered from these test units. All five of the bones were unidentifiable and represent only .00076% of the total site assemblage (Appendix VII). One fragment shows sign of polishing.

Historic Artifacts

Historic artifacts identified on the surface of Area C were limited to two wire fence staples and one historic ceramic. These artifacts were not collected for further analysis. Six small specimens of unidentifiable metal were recovered from the subsurface investigations of Area C, five of which were recovered from $^{1}/_{16}$ inch wet screening. These metal specimens are badly corroded and fragmented. They have a combined weight of 1.2 g.

Prehistoric Artifacts

Surface inventory of Area C identified one metate fragment, five prehistoric ceramics, one tested cobble, and seventy-five pieces of non-tool flaked-lithic debitage. Subsurface investigations of Area C recovered one flake tool, twenty pieces of non-tool flaked-lithic debitage and seven prehistoric ceramics.

One ground stone specimen is a fragmentary slab metate constructed of sandstone. It measures 22 x 17 x 7 cm. The grinding surface is relatively flat and has been shaped by pecking. The single grinding surface covers approximately half of the specimen and exhibits polishing and smoothing.

The flake tool is unpatterned, exhibiting both unimarginal and bimarginal use wear and retouching. It is manufactured from chert and broken into six pieces. Twenty pieces of non-tool flaked-lithic debitage were collected from subsurface testing. Seventeen (85 %) are broken flakes and three (15 %) are complete flakes. Additional quantitative data from surface and subsurface flaked lithic artifacts are combined and presented in Table 8.3. Small and medium flake sizes predominate, as do simple flakes. Complex flakes and shatter are less predominant and bifacial thinning flakes are minimally represented. The majority of these specimens (approximately 85 %) lack cortex. In general, the data illustrate the prevalence of small- to mid-sized simple flakes lacking cortex. This data suggest that early- to intermediate-stage lithic reduction activities occurred at this portion of the site. The smaller percentage of complex and bifacial thinning flakes present suggest that late-stage reduction activities also occurred, but were less common.

Twelve prehistoric ceramic sherds were collected from the site, five were on the surface and seven were recovered from Test Unit 1084N/882E. The sherds are all very small and are produced through the technique of mass-modeling (Dr. Richard Krause, personal communication 2003). They are grit-tempered. There is one lip sherd represented in the assemblage and the remainder are body sherds. Ten of the sherds display vertical simple stamping (Figure 8.10). It is not unlikely that all the sherds may be fragments of a single vessel.

Table 8.3. Quantitative data on surface and subsurface debitage, Area C.

	Hornfels/basalt	Quartzite/ Orthoquartzite	Chert	Chalcedony	Silicified Wood	Siltstone	Other	Total (%)
Size								
>1		3						3 (3.2%)
1-1/2	5	21	12	2		5	1	46 (48.4%)
<1/2	6	24	11	2	1	1	1	46 (48.4%)
Total (%)	11 (11.6%)	48 (50.5%)	23 (24.2%)	4 (4.2%)	1 (1%)	6 (12.2%)	2 (2.1%)	95 (100%)
Flake Type								
Shatter	4	13	5	1		1		24 (25.3%)
Simple	6	29	8	3	1	2	2	51 (53.7%)
Complex	1	6	7			3		17 (17.9%)
Bifacial Thinning			3					3 (3.1%)
Total (%)	11 (11.6%)	48 (50.5%)	23 (24.2%)	4 (4.2%)	1 (1%)	6 (12.2%)	2 (2.1%)	95 (100%)
Cortex								
Present	3	4	3			3	1	14 (14.7%)
Absent	8	44	20	4	1	3	1	81 (85.3%)
Total (%)	11 (11.6%)	48 (50.5%)	23 (24.2%)	4 (4.2%)	1 (1%)	6 (12.2%)	2 (2.1%)	95 (100%)

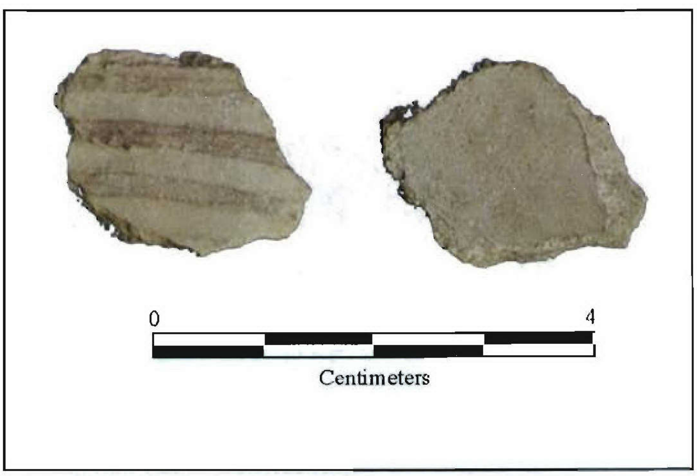


Figure 8.10. Ceramic artifact, 5LA3421.105.073.

Summary and Conclusions

Twenty-four test units were randomly selected to be excavated in Area C. One additional test unit was selectively placed to try and recover ceramics in an area where surface ceramics were present. This number is less than 1% of the total of Area C. The units were

excavated to various depths but artifacts generally were limited to Layer 1 and the upper part of Layer 2. Smaller artifacts were found in the waterscreen control samples and these could have migrated downward through various forms of bioturbation (i.e., cryoturbation, argilliturbation, floralturbation). There were no features or ethnostratigraphic horizons recognized in the test units from Area C. Artifacts were not concentrated in vertical units, and no diagnostics artifacts other than the few sherds were recovered. Subsurface excavations in Area C have demonstrated that there is little potential for this area to contribute to the prehistoric knowledge of the PCMS. A plan view of the site with the test units identified and those which contained artifacts is presented in Figure 8.2. It can be surmised from this visual image that the test units that produced subsurface artifacts do not cluster, rather they are dispersed across this large area.

Archeological investigations in Area C failed to identify any subsurface cultural horizon. Artifacts were sparse across the surface. Testing also indicates that the presence of cultural material is minimal here. It is therefore recommended that Area C has little potential to yield significant information on the prehistory of the PCMS. It is recommended that the protective fence be reduced omitting Area C. No further archeological work is recommended.

CHAPTER 9
AREA D

Introduction

Area D is on a terrace of Big Water Arroyo along the north side of the arroyo after its confluence with an unnamed tributary southeast of the homestead (Figure 9.1). The terrace is confined by the arroyo on one side and by the exposed sandstone bedrock ledge on the other side. The terrace slopes south to the arroyo (Figure 9.2). Area D was the location of the rockshelters and the historic sheepherder component recorded originally by DU in 1984 (Angulski 1984). In this portion of the site, DU had recorded four rockshelters, a stone corral, a stone enclosure and a stone wall. A pedestrian reconnaissance of Area D by FLC identified a third stone foundation, a possible prehistoric structure and a midden deposit that had not been previously identified by DU.

This portion of the site had received quite a bit of surface damage from large tracked vehicles particularly in the west half. A gap in the exposed sandstone ledge in this area provides an easy access for tracked vehicles traveling along Big Water Arroyo to ascend the rim. As a result, this area has suffered rather severe damage from tracked vehicles. Several backfilled test units were recognized in the area of the tracked vehicular disturbance. These were excavated by NMSU during the 2000 field season.

FLC conducted surface mapping, a geophysical survey and subsurface testing in Area D. Area D provided some of the most interesting data from the site, particularly as it relates to the site's prehistory and to the overall site geomorphology.

Historic Features

A dry-laid stone wall is constructed along the edge of the ledge above the terrace. A section of the wall continues below the rim and onto the terrace. The original site map has the stone wall continuing along the rim but east of the fenced site boundary. The areas outside of the boundary fence were not included in the investigation of Area D. The stone corral was clearly visible. This structure abuts the sandstone ledge along the extreme southeastern edge of the site boundary. The foundation probably represents a corral or animal pen. It was built against the side of the sandstone outcrop. The remains consist of a dry-laid sandstone wall, one to two courses high. It measures approximately 13 ft in length and 10 ft wide. This structure was mapped but was not investigated further by FLC.

A previously unrecorded stone foundation (Feature 1) was discovered during the inventory by FLC. This structure is also constructed of dry-laid sandstone of mostly one-course construction, although some of the sandstone slabs were very large. It measures approximately 13 ft x 9 ft with what appears from the surface to be an entryway in the northeast corner (Figure 9.3). At least a couple of the slabs were in an upright position. The

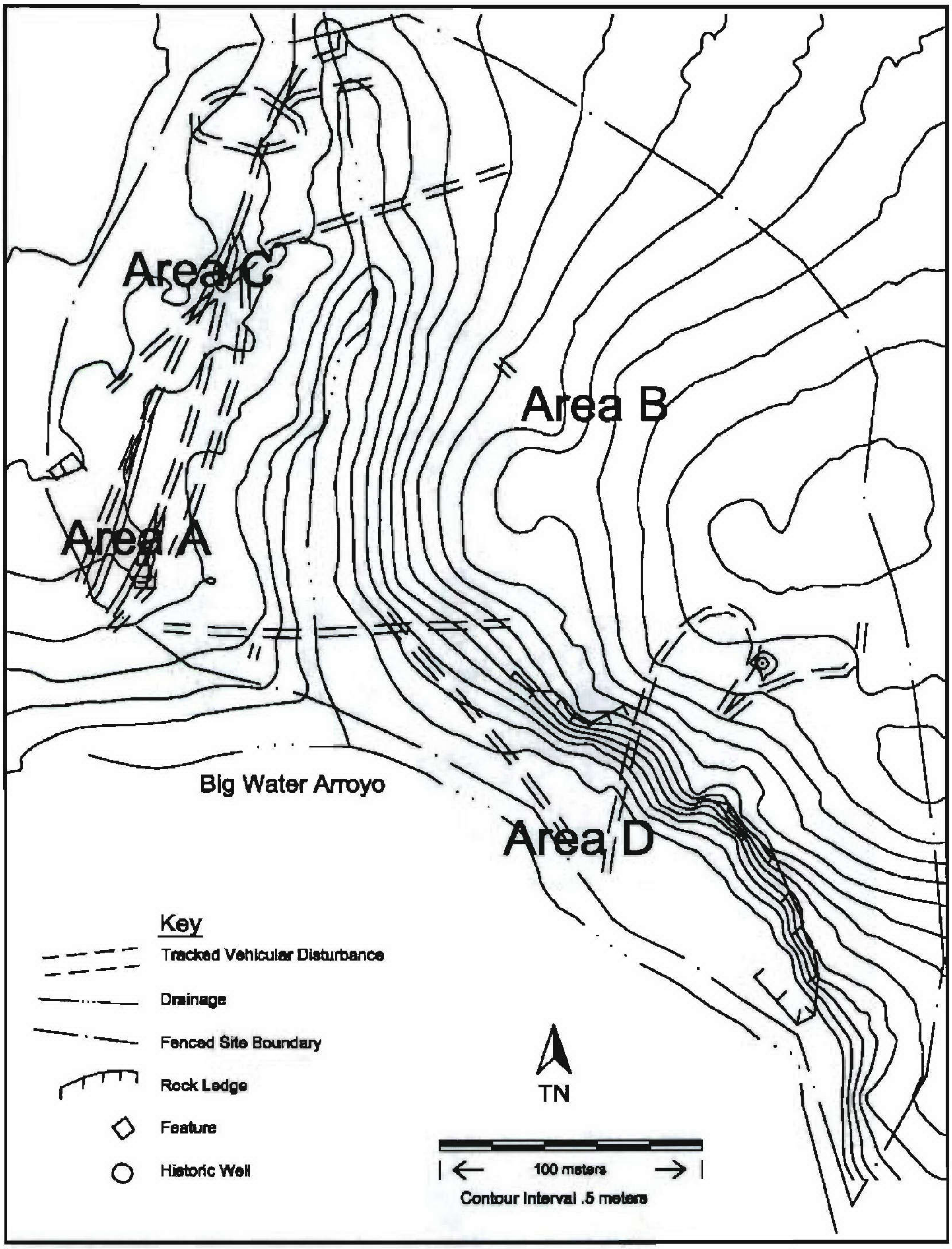


Figure 9.1. Topographic map of site areas, 5LA3421.

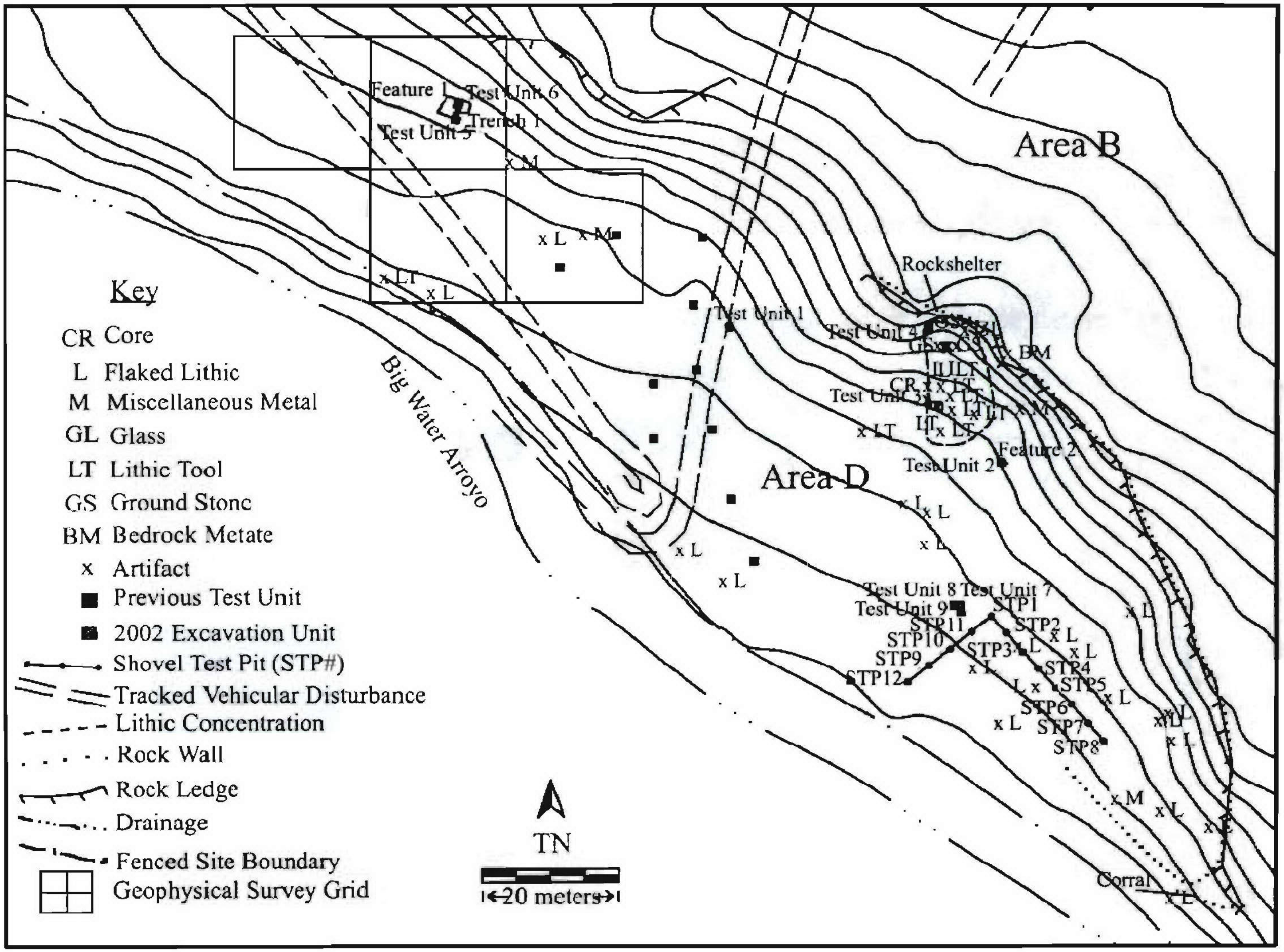


Figure 9.2. Topographic map of Area D.

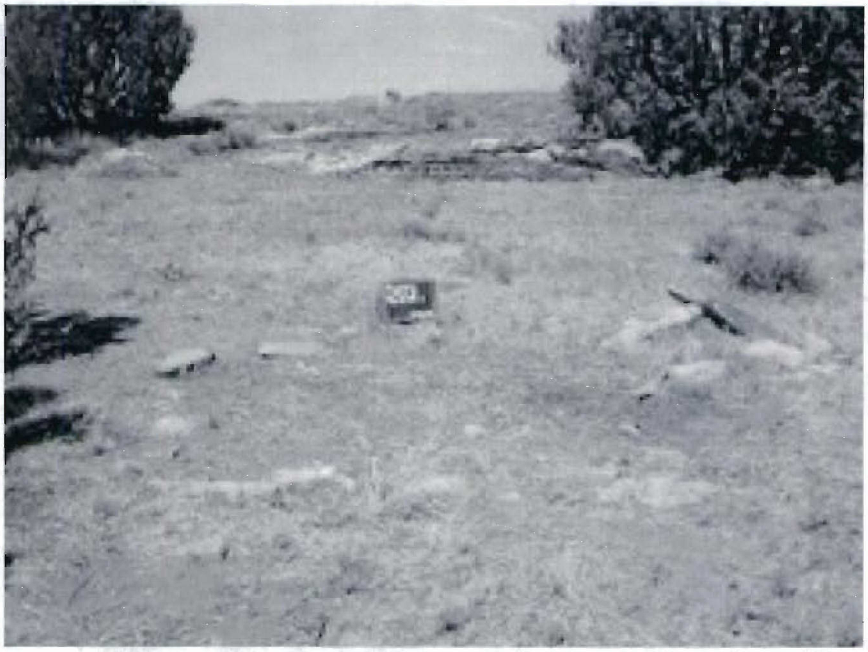


Figure 9.3. Feature 1, Area D. Note possible entry in the right middle portion of the photograph.

structure is nestled against a very large juniper tree that was probably present during the time of occupation, but was undoubtedly smaller.

Prehistoric Features

A single prehistoric feature was identified that had not been identified during the earlier survey. This feature (Feature 2) consists of an arc of sandstone rocks one course thick that measures approximately 2.8 m x 2.4 m. It appears similar to Late Prehistoric stone enclosures that appear elsewhere on the PCMS that have been interpreted as short-term habitations (Loendorf et al. 1996). It is located in the vicinity of the midden deposit and the collapsed rockshelter described below.

Four shallow rockshelters were identified by the early surveyors as having the potential to yield subsurface cultural deposits. All of the shelters previously described are very shallow overhangs and only one displayed surface artifacts suggesting it was utilized prehistorically. FLC identified the latter shelter as having the potential to yield significant subsurface deposit. It is difficult to know exactly which of four shelters this one represents on the original site map or from the original drawings (Angulski 1984). It was concluded that it is probably Rockshelter 2. This shelter measures approximately 5 meters across, 1.2 meters deep and 1 meter high. Large sandstone blocks at the surface suggest that the roof may have collapsed sometime after abandonment. In front and to the south is a clearly defined midden, which is interpreted to be associated with the rockshelter. A previously recorded (Angulski 1984) stone enclosure next to the sandstone ledge was not relocated.

Surface Investigations

Mapping and Surface Collection

A mapping datum was set in an open area on the terrace. The datum was referenced to the main site datum of 1000N /1000E located in Area B. The site datum for Area D was 859N/1040 E with an elevation of 94.434 meters. A reconnaissance survey was conducted over the area in transects spaced 5 meters apart. All surface artifacts that were identified were mapped with the Total Station. Collected artifacts included lithic tools and portable groundstone. The features, both historic and prehistoric, were mapped. Separate feature maps were constructed if these did not already exist. Also mapped were the corners of the 2002 test units, the test units from the 2000 excavations, the boundaries of the sandstone ledge, Big Water Arroyo, and the geophysical survey units.

Artifacts mapped on the surface at Area D included the following: 6 pieces of miscellaneous metal (pail, tin can, and unidentified metal fragments), 1 pieces of solarized glass, 52 unmodified flakes, 6 flaked tools, 3 projectile points, 3 pieces of ground stone (1 mano, 1 metate fragment, and 1 portable ground stone) and 1 core. Most of the prehistoric artifacts were concentrated around the midden and further downslope on the terrace (Figure 9.2). Surface artifacts collected include two pieces of ground stone, one flake, the three projectile points, the six flake tools, and the core. The flake was originally thought to represent a flake tool but was later reclassified. The metate fragment was not collected.

Geophysical Survey

Four 20 m x 20 m grids were surveyed with the gradiometer. These grids were aligned to true north and their corners were set in with the Total Station. The grids were set on even coordinates and were centered over the area of the newly recorded historic foundation, Feature 1 (Figure 9.2). The purpose of these geophysical grids were to quickly determine if buried magnetic features, such as trash scatters or hearths, were present. We did not conduct a resistance survey in Area D. The alignment and balancing were conducted on line with magnetic north.

Results of the gradiometer survey proved largely unsuccessful. We identified several areas of ferrous activity (Figure 9.4), but a search of the ground in these locations showed only pieces of barbed wire fencing. One pieces was tied to a large rock and was not seen when first surveying the area. The gradiometer did identify an area in the inside of the historic foundation that probably contained a piece or pieces of buried metal. A test unit was placed in this location and excavations retrieved a piece of a metal file. Other than these anomalies, the gradiometer data produced little additional information. The lack of data, then supports the interpretation that the historic component was fairly brief such as might be associated with ranching or sheep herding.

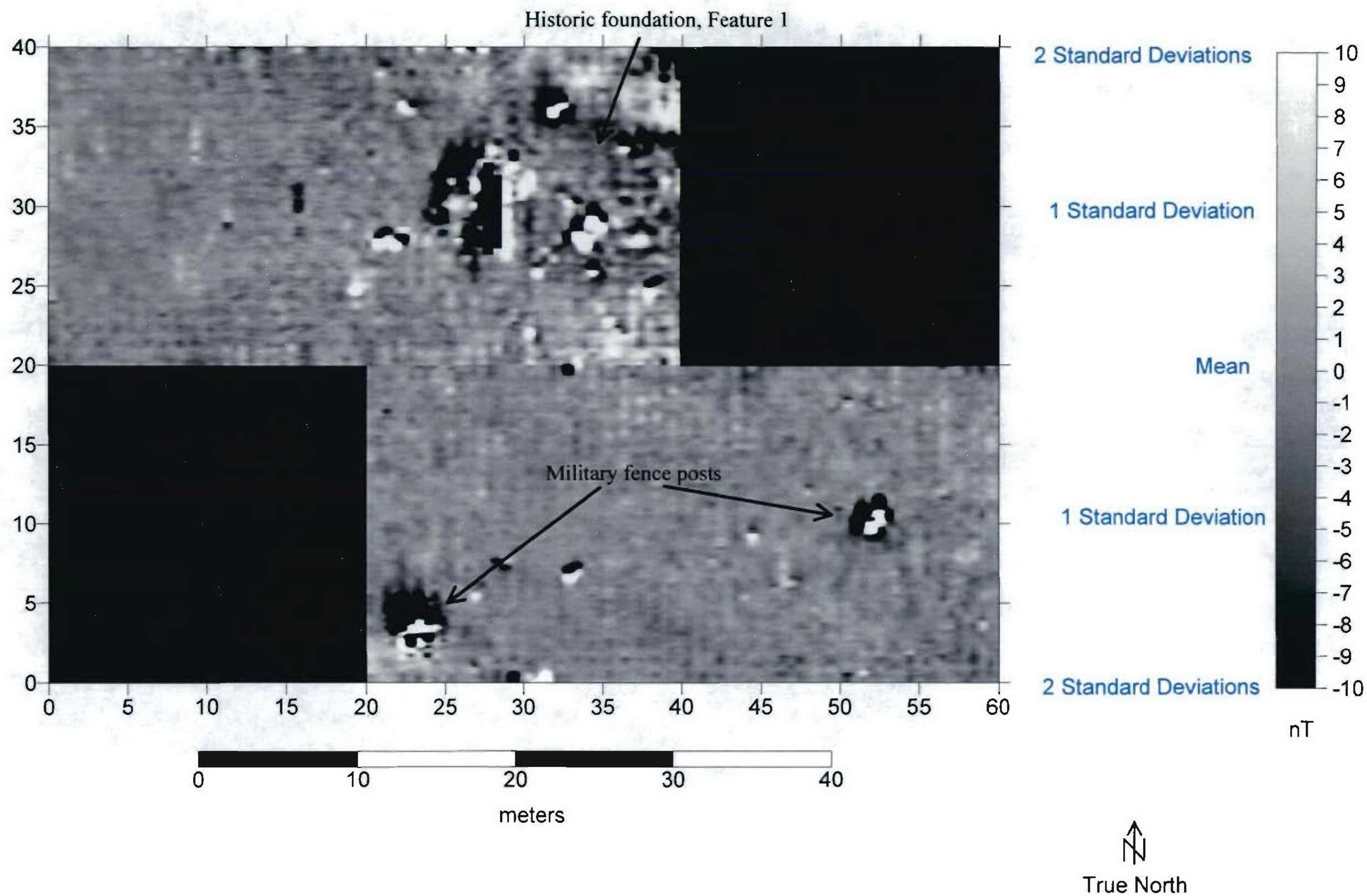


Figure 9.4. Map of results from gradiometer survey, Area D.

Subsurface Investigations

Shovel Tests

Twelve shovel tests were placed in two intersecting lines across the length and width of the southeast portion of Area D (Figure 9.2). The shovel tests were placed a distance of 4 m apart and were excavated to culturally sterile sediments, to bedrock , or until the test hole could no longer be excavated by hand with the available equipment (~ 70 cm). The first line of shovel tests contained 8 test holes and ran roughly parallel to the length of the terrace in the area of the prehistoric component. A second line of 4 shovel tests were excavated perpendicular to the first line and intersected at STP 1. Half of the shovel tests produced artifacts. These artifacts occurred at various depths throughout the shovel tests, but the majority were recovered from the upper 20 cm, although a few artifacts were recovered from a depth between 50 and 60 cm below the surface. Detailed stratigraphic descriptions of the shovel tests are provided in Appendix VII.

Test Units

Nine, 1 m x 1 m test units were excavated in Area D (Table 9.1). Two of these were placed in and adjacent to the historic foundation and the remainder were located in the prehistoric component. A narrow trench was also excavated connecting Test Units 5 and 6 in the historic structure.

Table 9.1. Test unit results, Area D.

Test Unit	Size (m)	Layers	Levels	Final Depth (cm bgs)
1	1 m x 1 m	3	10	97
2	1 m x 1 m	2	5	56
3	1 m x 1 m	3	11	103
4	1 m x 1 m	3	11	95
5	1 m x 1 m	3	5	44
6	1 m x 1 m	3	7	70
7	1 m x 1 m	2	3	26
8	1 m x 1 m	2	3	25
9	1 m x 1 m	2	3	21

Test Unit 1 (896.80N 1033.20E) Test Unit 1 was placed in an area of the site that was believed to possess significant sediment depth and possible buried ethnostratigraphic units (Pamela Cowen, personal communication 2002). The unit was located along the sloping terrace below the sandstone ledge and in an area that had received some surface damage from tracked vehicles. Three layers were excavated for a total depth range between 90 and 97 cm bgs. A single level was excavated from Layer 1, the loose overburden. No artifacts were recovered from this layer (Table 9.2). Layer 2 was excavated in five 10 cm levels. At the beginning of Layer 2, compaction from the tracked vehicles was noticed but diminished by the bottom of Level 2, Layer 2. Artifacts were recovered from Levels 1, 3, 4 and 5. Sediments were harder to begin with and then became softer with increased amount of

pebbles and decreased number of cobbles toward the bottom of this layer. A stratigraphic change was made to Layer 3 when the sediments became much more structured and soil moisture increased. The transition between the layers was gradual. One flaked-lithic artifact was recovered from Layer 3, Level 1 and another was recovered from Layer 3, Level 2. Two culturally sterile levels were removed before excavations were terminated at the bottom of Layer 3, Level 4.

Table 9.2. Cultural materials recovered from Test Unit 1, Area D.

Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Control/Flotation
1	1	3 - 7	No artifacts	No artifacts
2	1	7 - 11	2 flaked-lithics	No artifacts
2	2	9 - 10	No artifacts	No artifacts
2	3	10	1 flaked-lithic	5 bone, 1 charcoal
2	4	10	1 ground stone, 1 charcoal	1 flaked-lithic, 6 bone
2	5	10	No artifacts	4 flaked-lithics
3	1	10	1 bone, 1 charcoal	1 flaked-lithic
3	2	9 - 10	1 flaked-lithic	No artifacts
3	3	10 - 11	No artifacts	No artifacts
3	4	10	1 charcoal	1 charcoal

Three strata were observed in the wall profiles. The west (east-facing) and north (south-facing) wall profiles are illustrated in Figure 9.5. and the strata are discussed below.

Stratum I — Stratum I is a darkish grayish brown (10YR 4/2) coarse loam. The soil structure is single grained to weak platy. The lower boundary is abrupt and smooth. Bioturbation is present in the stratum along with a small percentage (<2%) of moderately sorted gravel. The sediments react violently to hydrochloric acid. No artifacts were noted in this thin (6-14cm) stratum that represents loose overburden.

Stratum II — Stratum II is a brown (10YR 5/3) fine silt loam. The soil structure is weakly developed subangular blocky. The lower boundary is gradual and smooth and the thickness of the stratum ranges from 22-44cm. Bioturbation is present as well as are moderately well-sorted pebble to cobble size gravel (25-30%). The reaction to hydrochloric acid is violent and increases in intensity as depth increases. Artifacts and charcoal are present in this stratum.

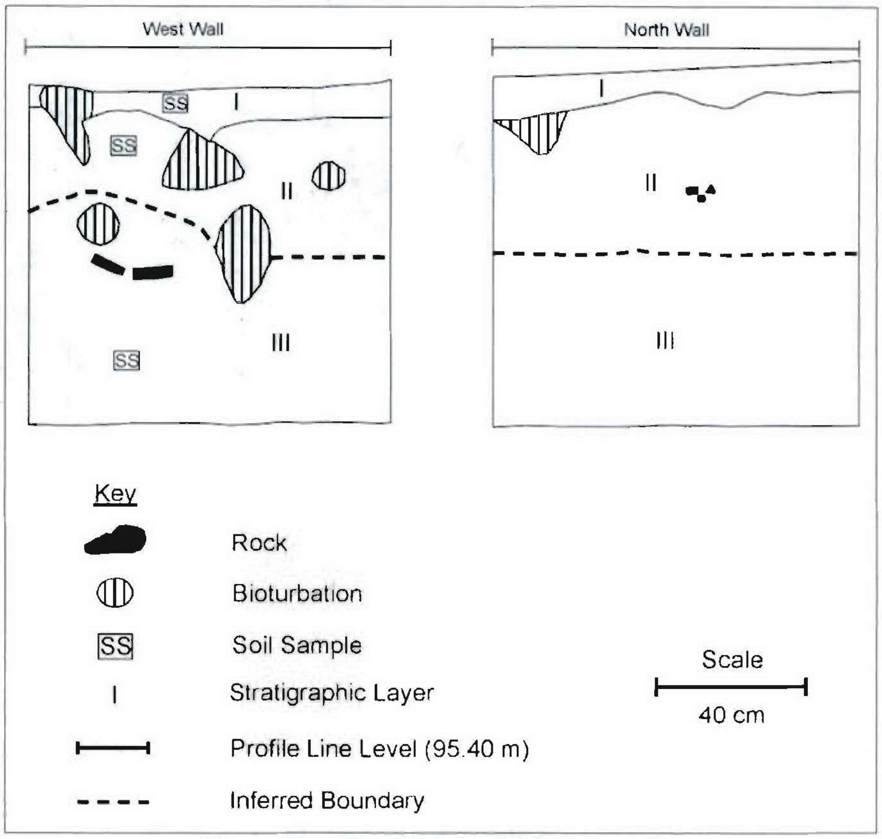


Figure 9.5. Test Unit 1, profiles, Area D.

Stratum III Stratum III is a pale brown (10YR 6/3) fine silty clay loam. The soil structure is well developed angular blocky. The lower boundary remains concealed. This stratum reacts violently to hydrochloric acid and the caliche content becomes more visible with depth due to an increase in moisture. The gravel content decreases (5-10%) from Stratum II and are well sorted. Artifacts and charcoal are present in the upper portion of this stratum.

Coordinating the excavated layers with the strata observed and recorded in the profile walls presented little problem in this test unit. Layer 1 is equivalent to Stratum I with the exception that Stratum I dips in places below the excavations of Layer 1 and into the upper few centimeters of Layer 2. The few flaked-lithic artifacts excavated from Layer 2, Level 1 would most likely be contained within Stratum II. Stratum II related well to Layer 2 and the single piece of ground stone and several flaked-lithic artifacts were associated with Stratum II. At the transition of Stratum II and Stratum III, the boundary is noted as being gradual into Stratum III, but no artifacts were excavated from this transition. Two flaked-lithic artifacts and a small piece of bone were recovered from Layer 3, which corresponds to Stratum III. Although artifacts were sparse in this test unit, they were continuous until a

depth of about 84 cm below the ground surface when they simply ceased to exist. An ethnostratigraphic horizon was not recognized during excavation nor was it evident in the profile strata.

After excavations were terminated, an auger test was placed in the bottom of the unit. This auger extended the depth of the unit to 2.2 meters below the unit datum. Two additional strata were recognized in this auger test probe. From about 1 meter to 1.5 meters (bgs) the sediments contained an increase in caliche and clay. This was followed by an increase in sand and a decrease in clay between 1.5 meters and 1.6 (bgs). This trend continued until about 1.86 cm (bgs) when a color change was noted along with a decrease in caliche and an increase in sand. At this point, it was felt that a stratigraphic change had been encountered. An increase in percentage of sandstone gravels and coarse sand was noticed between 1.96 meters and 2.16 m (bgs). At this point another possible stratum change was recognized. Physical properties of this last stratum included an increase in clay content, an increase in organic material and an increase in caliche. All these changes accompanied a color change. The change to a gray color along with the increase in organics and clay signifies a change to a more anaerobic environment. Shortly after this stratum was recognized, a large piece of sandstone, possibly bedrock, was encountered at a depth of about 2.21 meters, beyond which the auger was unable to penetrate.

Test Unit 2 (876.30N 1073.41E) Test Unit 2 was placed within Feature 2, a possible prehistoric structure. The feature was evident as a semicircle of exposed sandstone rocks that did not have the appearance of a natural grouping. A test unit within the possible feature would perhaps identify the nature and origin of the rocks. This unit was excavated in five levels within two layers. Layer 1 was excavated in a single level. It consisted of the loose, brownish silt at the surface. It ranged in thickness from 2 to 4 cm. Bioturbation from roots was present throughout. A number of the sandstone rocks, present at the surface, continued through the layer and into the next layer. Numerous sandstone pebbles were observed in the fill. Layer 2 began beneath the loose topsoil and continued to the contact with Layer 3, which was not excavated. Four 10 cm levels were excavated in Layer 2, with a final thickness that ranged from between 21 to 32 cm until either rocks prevented further excavation or until a layer change to Layer 3 was encountered. The majority of the artifacts recovered from this test unit were recovered from Layer 2 (Table 9.3).

While artifacts were found continuously throughout the entire depth of the unit, it could be argued that artifacts may have been concentrated in Layer 2, Level 2; however, this interpretation should be prefaced by acknowledging that bioturbation was extensive throughout the unit. The excavator noted that artifact frequencies were lower as the stratigraphic break was reached. A radiocarbon sample was collected from the flotation sample collected in Layer 2, Level 3. This sample was processed and produced a conventional radiocarbon age date of 990±40 BP (Beta-178246). The 2 sigma calibrated radiocarbon age of A.D. 990 to 1160 with an intercept date of A.D. 1020. Layers 1 and 2 correspond directly to strata I and II. Stratum III represents the unexcavated Layer 3.

Table 9.3. Cultural materials recovered from Test Unit 2, Area D.

Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Control/Flotation
1	1	2 - 4	3 flaked-lithics	6 flaked-lithics, 29 bone, 1 macrobotanical
2	1	2 - 12	3 flaked lithics, 1 shell	10 flaked-lithics, 44 bone, 1 shell, 1 macrobotanical, 1 charcoal
2	2	9 - 11	2 projectile points, 16 flaked-lithics, 1 flaked-lithic tool, 3 bone, 1 ceramic	104 bone, 1 charcoal
2	3	9 - 10	7 flaked lithics, 2 ground stone, 3 bone, 1 shell	16 flaked-lithics, 82 bone, 1 macrobotanical, 1 charcoal
2	4	5 - 12	6 flaked lithics, 2 bone, 1 bone bead	No artifacts

Three strata were recognized in the east (west-facing) wall and two in the south (north-facing) wall profile (Figure 9.6.). These strata are discussed below.

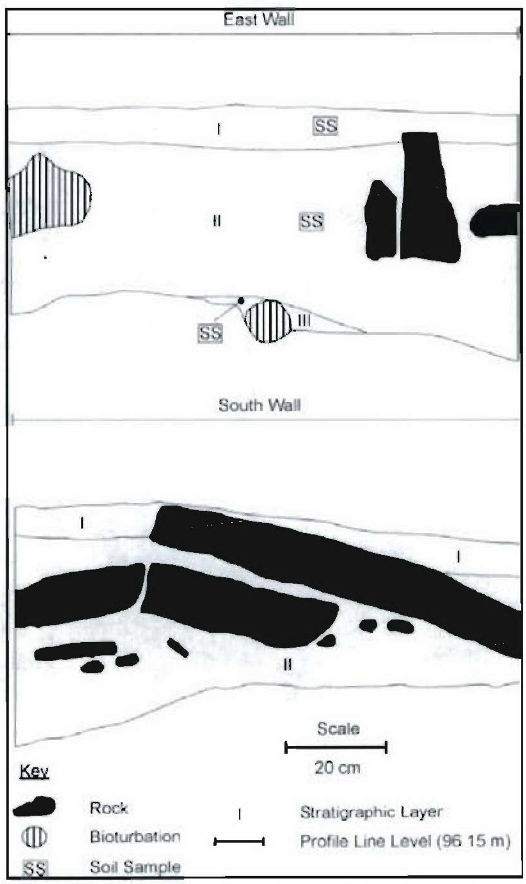


Figure 9.6. Test Unit 2, profiles, Area D.

Stratum I Stratum I is a dark brown (10YR 3/3), silt loam. The soil structure is weakly developed and subangular blocky. The lower boundary is abrupt and smooth. Bioturbation is present in the stratum as well as moderately sorted gravels (2%-5%). The sediments have a very slight reaction to hydrochloric acid. Few artifacts were present in this thin (6-8cm) stratum.

Stratum II Stratum II is a grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2), silty clay loam. The soil structure is moderately developed and angular blocky. The lower boundary is clear, smooth, and wavy due to bioturbation within the stratum. The reaction to hydrochloric acid is slight and the gravel content increases to 10% and is poorly sorted. Artifacts were more abundant and charcoal was present in the stratum.

Stratum III Stratum III is a pale brown (10YR 6/3), silty clay loam. The soil structure is well developed and angular blocky. The lower boundary of this stratum remains concealed, but has a depth of at least 4cm. The reaction to hydrochloric acid is violent, and the stratum has a lower gravel content than Stratum II at 2%. Gravels are well sorted. Bioturbation is also present and no artifacts were found in this stratum.

Some of sandstone rocks visible at the surface continued to the contact of Layer 3 and in places these rested along the stratigraphic break. It was determined that this grouping of rocks indeed represented a prehistoric structure of some type. This interpretation was supported by the presence of artifacts such as ground stone, a bone bead, two projectile points and a ceramic. Ceramics were not observed in any of the other test units in Area D. The sandstone was sitting along a plane that represented a stratigraphic break that could be interpreted as a floor. A definite stratigraphic change was noted at the contact with Layer 3.

Macrobotanical samples were set to High Plains Macrobotanical Services for analysis. These were collected from the flotation samples of the control units from each layer and level of the unit. Additional samples were retrieved from excavations over the course of the field work. Several samples were submitted for analysis because it was believed that the samples were obtained from a structure. It was hoped that the results from these samples would provide important information on questions concerning economic use of plant resources, perhaps gaining insight into the past environment. The results of this analysis are presented in full in Appendix II. The results were not very enlightening primarily because of the extensive amount of bioturbation that thoroughly mixed the seeds and plant remains throughout the sediments. With two exceptions, two charred pieces of one-seed juniper, the specimens represent uncharred seeds and seed fragments. The majority of these, which number in the thousands, are from ground ivy, goosefoot, amaranth and mustard. While goosefoot, amaranth and mustard, along with sunflower, may have been of economic importance to the prehistoric population, their presence in such numbers in these samples along with their presence at the site historically, suggests that they do no represent prehistoric economic use.

Test Unit 3 This 1 m x 1 m test unit was placed within a prehistoric midden deposit located downslope from a collapsed rockshelter. Sediments in this area were laden with charcoal, fragments of shell and pieces of burned plant materials. A concentration of artifacts (Figure 9.2) denoted the boundary of the midden. Test Unit 3 was excavated in eleven levels within three stratigraphic layers to a final depth of 1.03 meters bgs. Excavations in this test unit proved to be very rewarding in determining the potential of the prehistoric component in Area D to provide significant buried artifacts and deposits. Artifacts were concentrated in Layer 1, which was excavated for five levels (Table 9.4). The vast majority of the artifacts (discounting bone) were from Layer 1, Levels 2 and 3. After this, artifacts began to decrease by at least 50 % but continued to be recovered from the 1/4"in screen until Layer 2. At this point, we made the layer change primarily based on the significant decrease in artifacts. Charcoal was collected from Layer 2, Level 1 from a flotation sample. It was submitted to Beta Analytic for AMS dating (Appendix III). This sample of charred material produced a conventional radiocarbon age date of 3690±40 BP (Beta 178248). The calendar corrected 2 sigma date is 2200 to 1950 B.C. There are three intercept dates with the calibration curve. These are 2120 B.C., 2100 B.C. and 2040 B.C.

Table 9.4. Cultural materials recovered from Test Unit 3, Area D.

Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Materials Recovered Control/Flotation
1	1	0 - 10	17 flaked lithics, 1 projectile point	6 flaked lithics, 54 bone
1	2	6 - 10	38 flaked lithics, 1 bone, 4 lithic tools	1 shell, 3 lithic tools, 48 flaked lithics, 871 bone, 1 macrobotanical, 1 charcoal
1	3	10 - 11	40 flaked lithics, 1 lithic tool, 3 bone	82 bone, 20 flaked lithics, 1 worked bone, 1 charcoal
1	4	10	14 flaked lithics, 1 ground stone, 1 bone, 1 lithic tool'	22 flaked lithics, 173 bone, 1 charcoal
1	5	10	10 flaked lithics, 2 ground stone	2 flaked lithics, 44 bone, 1 charcoal
2	1	9 - 10	1 bone	5 flaked lithics, 291 bone, 1 charcoal, 1 macrobotanical
2	2	10	1 flaked lithic	4 flaked lithics, 81 bone, 1 charcoal, 1 macrobotanical
2	3	10	no artifacts	24 bone, 5 flaked lithics, 1 gastropod, 1 charcoal
2	4	3 - 6	no artifacts	2 bone, charcoal, 36 gastropods
3	1	7 - 10	no artifacts	2 flaked lithics, 1 charcoal
3	2	9 - 10	1 charcoal	4 flaked lithics, 17 bone, 37 gastropods, 1 charcoal, 1 macrobotanical

Despite the reduction in artifacts, charcoal and flaked-lithic artifacts were recovered from the control/flotation samples until excavations were terminated at Layer 3, Level 2.

In the field artifacts were not recovered from the last four levels. These levels were considered to be culturally sterile. Control/flotation samples processed in the laboratory, however, demonstrated artifacts were present to the ending depth of this test unit. Bioturbation could be a factor in the presence of the lower artifacts. Two auger tests in the bottom of the test unit extended another 1.20 meters until the auger encountered sandstone, possibly bedrock, which impeded further augering. A sample of gastropods collected from flotation of the control unit in Layer 3 Level 2 was submitted to Beta Analytic for radiocarbon AMS dating (Appendix III). This sample provided a conventional radiocarbon age of 6900±40 BP. The 2 sigma calendar corrected date is 5840 to 5710 B.C.. The intercept of radiocarbon age with calibration curve for this sample is 5750 B.C..

Six strata were defined in the east (west facing) and north (south facing) wall profiles (Figure 9.7). These are discussed below.

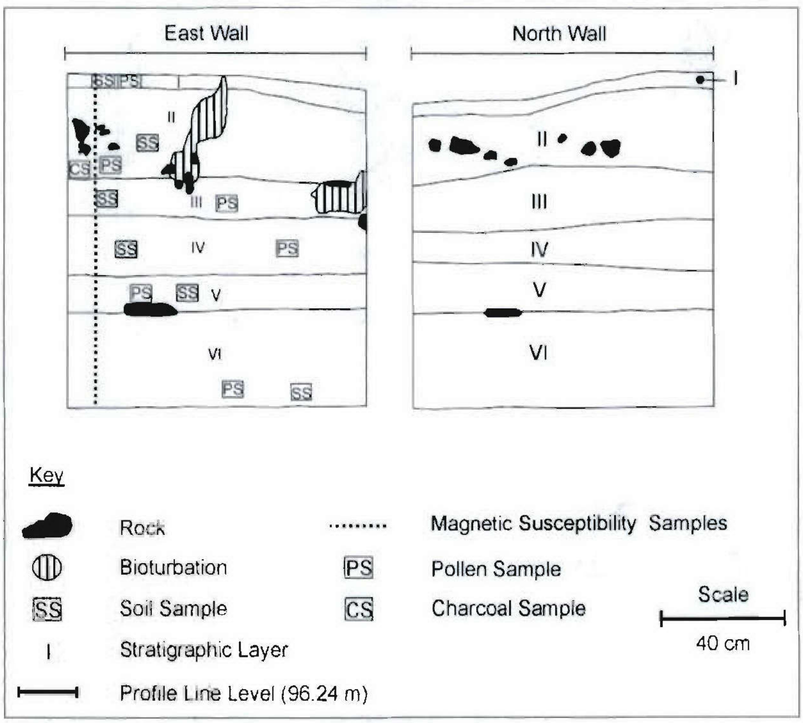


Figure 9.7. Test Unit 3, profiles, Area A.

Stratum I — Stratum I is a dark grayish brown (10YR 4/2), fine loam. The soil structure is single grain to weak platy and the lower boundary is abrupt and smooth. This thin stratum (4-7cm), which is identified as overburden, has a 30 % gravel content that is poorly sorted. The reaction to hydrochloric acid is slight and bioturbation and roots are present. Artifacts were present.

Stratum II — Stratum II is a dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2), fine loam. The soil structure is weak to moderately developed

subangular blocky. The lower boundary is abrupt to clear and irregular, and the thickness of the stratum is 22 to 28cm. Bioturbation is present with a slighty higher gravel content of 30 to 40% than the above stratum. The gravel is poorly sorted. The reaction to hydrochloric acid is slight and increases with depth in the stratum. Artifacts were present within the stratum as well as fire-cracked rock.

Stratum III — Stratum III is a dark gray (10YR 4/1), fine loam. The soil structure is much like Stratum II, which is weak to moderately developed subangular blocky. The lower boundary is clear and irregular and the stratum has a thickness of 10 to 12cm. Bioturbation is present, as well as a lower gravel content than the stratum above at 20 to 30%. The gravel is poorly sorted and contains pebble- to boulder-size angular inclusions. Fire-cracked rocks were also present in this stratum. Artifacts were not recognized in this stratum. A strong reaction to hydrochloric acid was observed.

Stratum IV — Stratum IV is grayish brown (10YR 5/2) to light grayish brown (10YR 6/2), coarse silt loam. The soil structure is prismatic to subangular blocky and is moderately developed. The thickness of this stratum ranges from 18 to 20cm and the lower boundary is clear and smooth. The stratum exhibits a significant change in gravel content from Stratum III with 7 to 10% poorly sorted granule- to cobble-size gravel. Bioturbation is present in the stratum as well as artifacts. This stratum also reacts strongly to hydrochloric acid.

Stratum V — Stratum V is a pale brown (10YR 6/3) to brown (10YR 5/3), fine loam. This moderately developed subangular blocky stratum has a gradual and smooth lower boundary. The reaction to hydrochloric acid is strong and gypsum particles appear in the stratum. Gravel continues to decrease within this stratum with a 2 to 5% content that is poorly sorted, granular in size, and subangular blocky. Artifacts decrease from Stratum IV.

Stratum VI — Stratum VI represents a pale brown (10YR 6/3) to brown (10YR 5/3), fine to medium silt loam. This stratum is greater than 30cm thick but the lower boundary remains concealed. The structure is moderately developed and subangular blocky. The reaction to hydrochloric acid is strong. The gravel content decreases to between 0 and 1%. Artifacts were present in the control sample but were not observed in the profile. Charcoal is present within the stratum.

While it was noted in profile that Layer 1 could be divided into three strata (Strata I - III), it was excavated in 5 10-centimeter levels due to the abundance of cultural material and the lack of explicit differences in soil texture, color, etc. observed while excavating. A change to Layer 2 was initiated mostly on a noticeable decline in cultural materials. Layer 2 comprises Strata IV, V and the upper portion of Stratum VI (near the gradational

boundary). It was kept as one large layer during excavation because of the similarity of soil structure and texture observed in the field. The layer change to Layer 3 was made when the lower portion of Stratum VI was encountered, because it was felt that this contained a higher silt content, which in fact was supported through the textural analysis.

A number of special sample analyses were conducted on the strata from this test unit. These analyses included USDA textural analysis, soil pH, % lime (%CaC03) content, percent organic matter, magnetic susceptibility, radiocarbon and pollen. In addition, macrobotanical samples, including gastropods, were collected from the flotation samples and submitted for analysis. Results and interpretations of the various analytical samples is discussed below. For specific detail, individual results from all these analyses are reported in full in Appendices I-V of this report.

Soil textural analysis, pH, CaC03 and percent organic matter were conducted by Colorado Analytical. The results of the textural analysis vary slightly with the interpretations of the field archeologists, but these variances are considered minor and the field analysis does not misrepresent the actual soil textures to any great degree. In particular, textures identified as loams and silt loams in the field were actually determined to be sandy loams and clay loams after hydrometer analysis. The six strata identified in the field were sampled for soil textural analysis. The results are presented as USDA classes. Stratum I is a sandy loam (56% sand, 34% silt and 10% clay), Stratum II is a sandy loam as well (62% sand, 28% silt and 10% clay), and Stratum III is a loam (42% sand, 36% silt, and 22% clay). Strata IV, V, and VI are clay loams. Their textural percentages are as follows: Strata IV (30% sand, 39% silt and 31% clay), Strata V (32% sand, 39% silt, and 29% clay), and Strata VI (22% sand, 47% silt, 31% clay). Percent organic matter was calculated for each of the strata. These samples steadily decrease from 3.7% in Stratum I to .09% in Stratum VI. Strata II and III have a percent organic matter of 1.6, Stratum IV has a percent organic matter of 1.1 and both Strata V and VI have organic matter percentages of 0.9. This sequence demonstrates the high percentage of organic matter in the upper stratum that represents the overburden which contains an abundance of leafy organic materials along with seeds and animal matter. Strata II and III represent prehistoric midden deposits. Below Stratum III, the organic matter drops off significantly and thus is consistent with the decrease in artifacts. The pH value of 7.7 in Stratum I represents the lowest of the profile. The values are consist from Strata II through Strata V (7.9). A slight increase is noted in Stratum VI (8.2). Since most soil pH's range from 5 to 9, the values from Test Unit 3 are typical. A neutral pH has a value of 7. Lower pH values indicate an acidic environment while higher values signify more alkaline. Soil pH trends are to increase through time, which is what is expressed in Test Unit 3. In reviewing the lime (% CaC03), we observe a rather sharp increase from Strata I (3.1) and II (3.6) to Stratum III (11.9). In Stratum IV the CaC03 remains high (12.2) and decreases to 7.9 and 9.2 in Strata V and VI respectively. Since calcium carbonate is transported by solution through the soil profile, the decrease suggests that the concentration in Stratum III and Stratum IV is the depth of the current wetting zone, and that the lower calcium carbonate concentrations may indicate a previous soil horizon.

Magnetic susceptibility samples were collected every 2 cm down the east wall profile. These samples were submitted to the Department of Anthropology and Earth Sciences at Moorehead, Minnesota. Results of the mass susceptibility results are presented in Figure 9 (Appendix I). The mass susceptibility data show well developed and highly magnetic soils in the upper strata (Stratum I, II, and III), but especially in Stratum II. There are basically four mass susceptibility peaks– three in Stratum II and one in Stratum III. Most likely the peak measurement of magnetic susceptibility in the upper stratum reflect the increases in the formation of organic iron compounds from microbial activity (Appendix I). These values remain relatively high until about 47 cm bgs or the base of Stratum III, where they begin to decrease. A very light increase in Stratum VI between 85 and 95 cm bgs may indicate a potential developed or buried soil (Appendix I). The high values in the upper strata are consistent with the interpretation that these sediments represent organically enriched midden deposits, probably the result of accumulations of cultural activities from the occupation of the rockshelter a few meters upslope.

Strata I, II and III accumulated through the same processes as evident in their similar organic and inorganic properties. Strata II and III may represent a buried A soil horizon This interpretation is supported by the high magnetic susceptibility values and the relatively large increase in calcium carbonate in Strata III and IV, which likely indicate a buried B soil horizon. Stratum IV likely represents a gradual boundary between Stratum III and Stratum V. In Stratum V, pH remains consistent as before, but the calcium carbonate declines significantly. A slight increase in fine grains in conjunction with a slight increase in magnetic susceptibility along with the decrease in calcium carbonate may indicate a potential buried soil.

Pollen samples were collected from the strata in this profile and submitted to Dr. John Jones, Texas A & M University. This report is presented in its entirely in Appendix V. A total of six samples, one from each strata, were submitted for analysis. The results demonstrate that there a sufficient number of pollen grains (200 or 400+) were obtained from each of the samples. The samples were dominated by durable, abundant pollen grains that included *Artemisia,* low spine Asteraceae, Cheno-Am, Poaceae, *Juniperus* and *Pinus* types. Most of these are identified as background "pollen rain" (Appendix V). The increase in P. ponderosa and Pinus edulis in the upper strata (Strata I and II) is likely due to better preservation (i.e. closer in time) in these strata. A single *Zea mays* pollen grain was identified in the sample from Stratum II, along with a slight increase from Polygonaceae, *Eriogonum* and Brasicaccae, all potentially important economic plants (Moerman 1998 and Yanovsky 1936). Otherwise this pollen sequence does not show signs of significant vegetation changes and it is likely that the environment has remained relatively stable over the past several millennia (Appendix V).

The control samples from each layer and level in Test Unit 3 were subjected to flotation as opposed to waterscreening because we felt that these deposits might contain important macrobotanical samples that could help explain past behaviors at the site, particularly those related to subsistence. As is the case with all macrobotanical samples from

this site, the ubiquity of rodent disturbance to a large degree compromises the interpretive potential of the data. The results of the macrobotanical analysis are presented in Appendix II. Several pieces of one-seed juniper charcoal were recovered from the test unit but none were large enough to allow for dating. All other specimens identified from the samples occur in the area at present. Again, as with other samples from this site, these species are mostly invasive ones and their association within the archeological sediments are probably the result of intrusive processes. Several gastropods were found during excavation and flotation. These were identified by High Plains Macrobotanical (Appendix II). The species recovered from this test unit include the following: *Vallonia gracilicosta*, *Pupilla muscorum*, *Fossaria parva*, *Pupilla blandi*, *Gastrocopta procera,* and Succinea grosvenori. A discussion of gastropod ecology is presented in Appendix II. In general most of these gastropods can live either on land or in water. *Fossaria parva* "lives in wet, marshy places, generally out of the water, on sticks, stones, or muddy flats. It is more prone to leave the water than any other species of the family." (Rocque 1970:478). *Gastrocopta procera* is "found among vegetation: grass, shrubs, or woods area, but noted that woods are not required." (Rocque 1970:728-729). *Pupilla muscorum* is "especially abundant in rocky areas such as limestone quarries and escarpments, under limestone slabs with accumulations of rock powder and soil, and in joints of fissures of rocks" (Rocque 1970:732). *Succinea grosvenori* "tolerates an astonishingly wide range in practically all external conditions. It occurs from the warm humid Gulf coast to semi-arid areas in the great plains and mountain states, and in British America it extends north within the border of Northwestern Territory (Rocque 1970:705)." Finally, *Vallonia gracilicosta* is found in wooded areas under logs, leaves, branches, and every sort of debris. It is most common in the prairie groves and border areas in Iowa but is know to extend to Zion National Park (Rocque 1970:762). Possibly there could be some indication of climate change represented in the snail assemblage; however, these snails are not uncommon in the area and, as represented by the 5,800 B.C. date from a snail sample, have been here prehistorically as well.

Two auger tests were placed in the bottom of Test Unit 3 once excavations were terminated. Each produced very similar results in stratigraphic sequences. The first 80 cm of each auger test contained a pale brown to very pale brown (10YR 6/3-8/3) silt loam. Within the 80 cm, a charcoal sample was taken from each and a bone fragment was recovered from one. The next stratum change encountered contained a highly gypsiferous, fine, sandy clay loam. The thickness of this varied between the two auger tests (50 cm and 30 cm). One charcoal sample was recovered within this stratum. The third change in sediments in each auger test did not mirror each other. One contained a silty clay loam that differed only very slightly from the stratum above in color, CaCo3 reaction, and gypsum content. In the other auger test, a very different type of third change occurred. A layer of granule to pebble size gravel was encountered that had no CaCO3 reaction. Only a very small amount of silt was present which serves as the matrix for this stratum. The gravel was very angular and by material type was considered not well sorted. This thin stratum (3cm) was most likely deposited in an alluvial environment. Below each of these stratigraphic changes sandstone was hit with the auger, which is thought to be possible bedrock.

Test Unit 4 Test Unit 4 was located just in front of the backwall of a small rockshelter. This rock shelter is really nothing more than a shallow alcove with sediments derived largely from three sources: attrition of the sandstone roof and walls, colluvium and midden debris. Excavation of the test unit was conducted in eleven levels within three layers to a final depth of 95 cm bgs (Table 9.5). At which point, excavations were terminated because either a very large piece of rooffall or bedrock in the bottom of the unit prevented further excavation.

Table 9.5. Cultural materials recovered from Test Unit 4, Area D.

Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Control/Flotation
1	1	0 - 5	1 flaked lithic	1 bone, 1 bottle glass, 1 flaked lithic
2	1	4 - 10	no artifacts	6 bone, 1 flaked lithic
2	2	9 - 11	7 flaked lithics, 1 bone, 1 wood	1 charcoal, 8 flaked lithics, 7 bone
3	1	8 - 10	3 bone, 1 charcoal, 1 lithic tool, 15 flaked lithics	1 charcoal, 15 flaked lithics, 1 lithic tool, 31 bone
3	2	9 - 12	12 flaked lithics, 3 bone	1 charcoal, 15 bone, 8 flaked lithics
3	3	9 - 10	1 flake tool, 2 ground stone, 8 flake lithics	13 bone, 7 flaked lithics
3	4	10	5 flaked lithics, 2 bone, 1 lithic core, 1 lithic tool	1 charcoal, 7 flaked lithics, 34 bone
3	5	9 - 11	1 projectile point, 1 bone, 5 flaked lithics, 1 mano	1 charcoal, 3 flaked lithics, 105 bone
3	6	10	10 flaked lithics, 1 projectile point	1 macrobotanical, 1 charcoal, 27 flaked lithics, 49 bone
3	7	10	1 bone, 13 flaked lithics	1 charcoal, 1 macrobotanical, 13 bone, 2 flaked lithics
3	8	0 - 6	3 flaked lithics, 1 bone	11 flaked lithics

Layer 1, Level 1 consisted primarily of loose surface sediments or overburden. Two flakes were found in this layer. A layer change to Layer 2 was initiated when rocks, pebbles and a better developed soil structure were encountered. Layer 2 was excavated in two levels. No artifacts were recovered from Layer 2, Level 1 during excavation but a single flake was recovered from the control unit. A high percentage of gravel, boulders and cobbles begin to appear in Layer 2. These were sandstone, mostly subrounded to rounded. Towards the the bottom of Layer 2, Level 2 the sediments color started to change to a darker grayish brown with inclusions of charcoal and an increase in artifacts, especially toward the bottom of Layer 2, Level 2. A layer change was made to Layer 3 when the sediments became really dark gray and larger cobbles and small boulders began to appear in the unit. Layer 3 was excavated in eight 10 cm levels. Artifacts increased from the above strata but remained fairly constant throughout this thick layer with one noticeable increase in Level 6, Layer 3. Bioturbation is fairly constant throughout the layer as well, but the massive amount of rocks has lessened some of the intrusions from animals that is evident in other test units from Area D. Sediments remained fairly consistent throughout and no real stratigraphic change was noted in this thick midden-like deposit. The grayish brown color is presumed to reflect enrichment from charcoal although the presence of individual charcoal pieces was rather

uncommon. Control samples from Layer 3, Levels 5 - 8 were not waterscreened but were floated instead. Charcoal samples from Levels 5 and 6 of Layer 3 were combined and submitted for a standard radiocarbon date. The conventional radiocarbon age is 2660 ±110 BP (Beta 178251) was received on this sample. The calendar correct 2 sigma date is 1030 to 520 B.C. and the intercept of radiocarbon age with calibration curve is 820 B.C. (Appendix III).

Three strata were defined in the east (west-facing) and north (south-facing) wall profiles (Figure 9.8.). The three strata are discussed below. Strata I through III correspond to Layers 1 through 3 respectively.

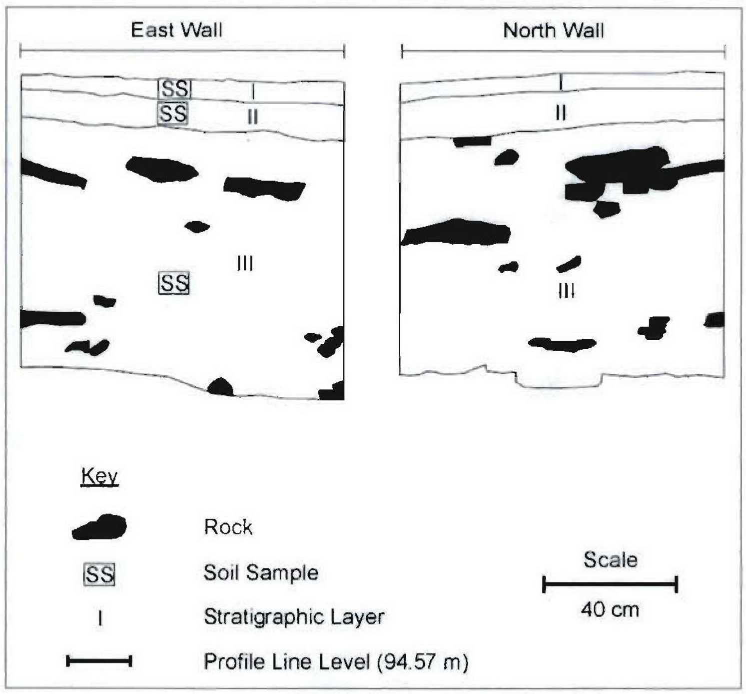


Figure 9.8. Test Unit 4, profiles, Area D.

Stratum I — Stratum I is a brown (7.5YR 5/2), loam that is very thin 5-7cm and primarily represents overburden. The structure of this stratum is weakly developed and single grained with vegetation, including roots, being abundant. The lower boundary is clear and smooth. The reaction to hydrochloric acid is slight and the gravel content ranges from 5 to 10% with rounded to subrounded gravel. Artifacts are present in this stratum.

Stratum II — Stratum II is a dark brown (7.5YR 4/2), loam. The soil development of this stratum is moderate to well-developed and the pedogenic structure is prismatic to subangular. The lower boundary is clear and smooth and the stratum has only a slight reaction to hydrochloric acid. Roots and

bioturbation are present as well as an increase in artifacts and gravel. Gravels are estimated at 10 to 20 % within the stratum and they are mostly subrounded. This stratum is 7 - 10 cm thick. Artifacts are present in this stratum.

Stratum III — Stratum III is a very dark gray (10YR 3/1), silt loam. This stratum nearly 90 cm in thickness and its lower boundary remains concealed. The structure is well developed and subangular to angular. The reaction to hydrochloric acid is violent and roots are present throughout. The gravel content significantly increases from Stratum II at 50 to 70% including gravel- to boulder-size subrounded inclusions. Artifacts are present throughout and a flat slab was also noted. This slab could be cultural but due to its thickness and size, it most likely is the result of rock fall from the small rock shelter above the unit.

A single soil sample from Stratum III was sent to Colorado Analytical for textural results and a percent organic matter was determined. The USDA texture of this same sample is a clay loam (42% sand, 31% silt and 27% clay). This is at odds with the silt loam that was reported from the field forms. This discrepancy, however, is not considered significant. Other than radiocarbon and soil, the other samples sent to analysis were the macrobotanical samples (Appendix II). Seeds, fragmented and whole, and gastropods were recovered from the flotation samples. Three samples from the lower levels were sent for analysis. The results are presented in Appendix II. One piece of one-seed juniper charcoal was recovered while the other specimens represent uncharred whole and fragments of seeds. All of these seeds are currently present in the environment surrounding the site. The vast majority are invasive weeds and probably represent intrusions into the prehistoric matrix through various processes of bioturbation.

The soil consistency, texture and color remained so constant throughout Stratum III (Layer 3) that it was not possible to differentiate ethnostratigraphic or soil horizons in this stratum. The noticeable increase in artifacts within Levels 5 and 6 of Layer 3 may signify a buried cultural horizon, which would by association possibly represent a buried soil. Human occupation is most likely to occur on a stable land surface, one which is subject to ongoing soil formation processes. This proposed ethnostratigraphic horizon dates to the Late Archaic, which is consistent with the projectile point type that is reported to span from 1000 B.C. to A.D. 1200 (Lintz and Anderson 1989: 155).

Test Units 5 This test unit was located adjacent to Feature 1, the historic stone foundation. The purpose was to test for the potential of buried historic deposits that might be associated with the stone foundation (Figure 9.9). It was speculated that this stone foundation might have once been a shallow dugout. The unit was excavated in five levels within three layers to a final depth of 44 cm bgs (Table 9.6).

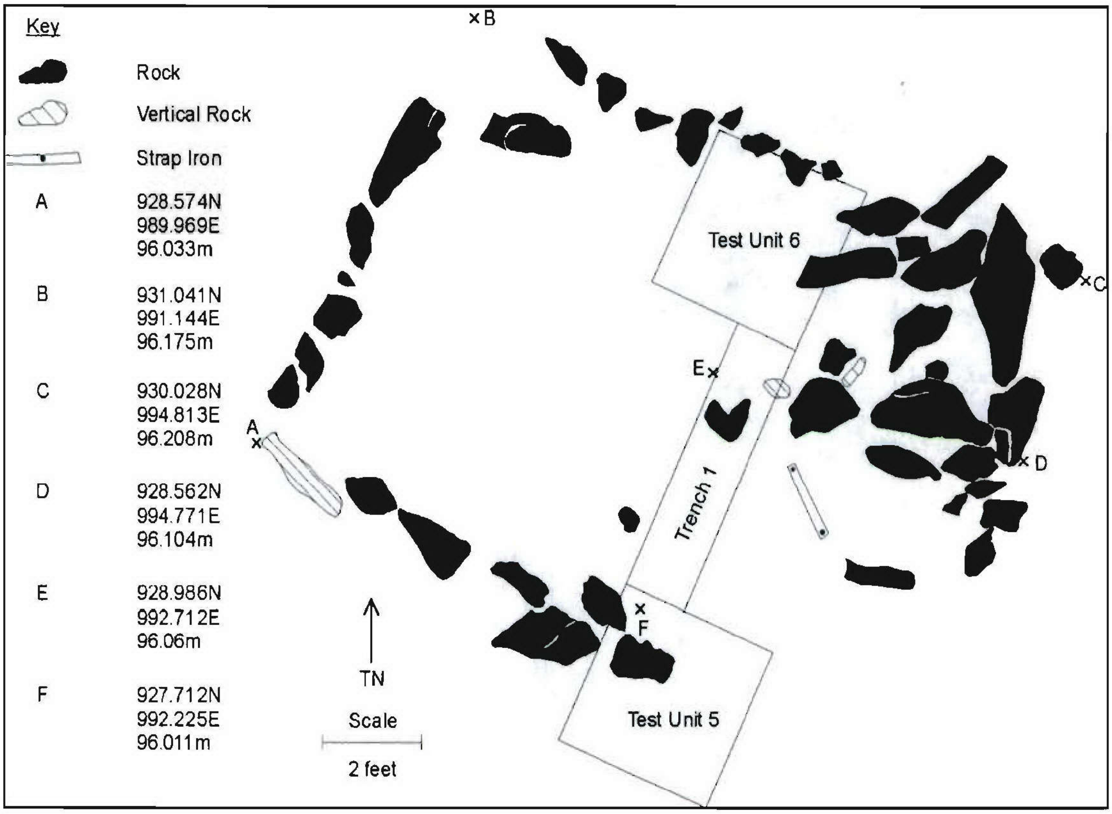


Figure 9.9. Feature 1, Test Units 5 and 6, Area D.

Table 9.6. Cultural materials recovered from Test Unit 5, Area D.

Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Materials Recovered Control/Flotation
1	1	1 - 3	no artifacts	no artifacts
2	1	8 - 11	no artifacts	no artifacts
2	2	10	no artifacts	1 bone
2	3	10 - 11	no artifacts	no artifacts
3	1	9 - 10	no artifacts	no artifacts

Layer 1, the overburden was removed as a single layer that ranged from 1 - 3 cm thick. Sediments in Layer 1, Level 1 consisted of a loose, brownish loam with extensive bioturbation primarily from roots but animal burrowing was in evidence. Much of the material removed as overburden consisted of plant roots and surface organic debris. Sandstone rocks were present on the surface of the test unit and it was suspected that these might be related to the historic foundation. If so, then the portion of the unit north of the rocks would be within the Feature 1 while south of the rocks would be outside. Charcoal was noted in this layer but was not collected. A change to Layer 2 was initiated at the

bottom of the loose overburden at its contact with underlying, more developed soil. Bioturbation from roots continued, but was less extensive than the previous layer. A large sandstone boulder, exposed at the surface, continued into Layer 2. No artifacts were recovered from Layer 2, Level 1. Sediments in Layer 2, Level 2 were the same as the above level with a slight increase in compaction. The sandstone boulder was removed from this level because it was obvious that sediments were the same on either side of the boulder, thus demonstrating that the sandstone rock did not represent a wall. No artifacts or charcoal were recovered from this level, however, a single bone was found in the control sample. Excavations continued in Layer 2 for another 10 centimeters before a layer change to Layer 3. In Layer 2, Level 3, bioturbation from rodents increased and as a result these sediments became looser and more single-grained. No artifacts or charcoal were recovered from this level. The change to Layer 3 was mostly made on a color change to a more reddish hue and more well-developed soil structure. Excavations were terminated at the bottom of Layer 3, Level 1 after essentially five culturally sterile levels had been removed from this test unit.

Four strata were defined in the west (east-facing) and north (south facing) wall profiles (Figure 9.10.) and these are discussed below. Strata I and II correspond to Layer 1. Stratum III corresponds to Layer 2 and Stratum IV corresponds to Layer 3.

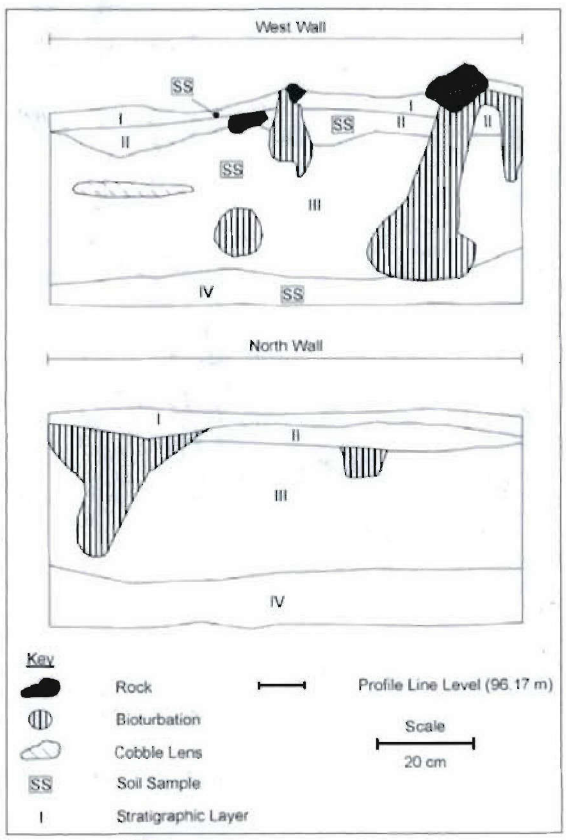


Figure 9.10. Test Unit 5, profiles, Area D.

Stratum I — Stratum I is a brown (10YR 5/3), sand silt with fine sand grains. The stratum is thin (2-12 cm) and has a clear and wavy lower boundary that is broken by bioturbation. The soil structure is single grained and the reaction to hydrochloric acid is violent. The gravel content of the stratum is 0 to 1%. Charcoal was present. No artifacts were found.

Stratum II — Stratum II is a brown (10YR 5/3), sandy silt. This stratum is not as thick as Stratum I (3-5 cm) and has a clear and wavy lower boundary that is also broken by bioturbation. The soil structure is single grained to subangular blocky. The stratum also has a violent reaction to hydrochloric acid and has a low gravel content at 1%. No artifacts were present within the stratum.

Stratum III — Stratum III is a brown (10YR 5/3) sandy silt loam that is 23 to 25 cm in thickness. The structure is subangular blocky and the lower boundary is gradual and smooth. The reaction to hydrochloric acid is violent and the gravel content increases slighty to 5%. Bioturbation is still present. No artifacts were found in the stratum.

Stratum IV — Stratum IV is a yellowish brown (10YR 5/4), sandy silt loam. The stratum thickness is unknown since the lower boundary remains concealed. Just over 10 cm of this stratum was exposed. The soil structure is single grained to subangular blocky and has a more violent reaction to hydrochloric acid than Stratum III. Bioturbation is still present as well as a 5% gravel content represented by sandstone pebbles. No artifacts were found.

Five levels of culturally sterile sediments were excavated from this test unit. It was clear that the sediments here were not cultural, historic or prehistoric, and investigations conclusively established the lack of archeological potential in this area of the site.

Test Unit 6 This Test Unit was located in the northeast corner of Feature 1 (Figure 9.9), the historic stone foundation. The purpose was to test for the possibility of a ramped entryway into what was suspected of being a filled-in dugout. Excavations in Test Unit 6 consisted of seven levels within three layers (Table 9.7). The north and east portions of the test unit

Table 9.7. Summary Data for Test Unit 6, Area D.

Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Materials Recovered Control/Flotation
1	1	0 - 10	no artifacts	no artifacts
2	1	4 - 10	1 metal file, 1 biface fragment	1 flaked lithic
2	2	10	no artifacts	1 flake lithic
2	3	10	1 bone, 1 charcoal sample	1 charcoal sample, 1 macrobotanical, 2 flaked lithics
3	1	10	1 bone, 1 worked bone	no artifacts
3	2	10	no artifacts	no artifacts
3	3	10	1 charcoal sample	no artifacts

abutted foundation rocks. Placement of this unit also took into account an anomalous reading obtained from the magnetometer survey. This reading indicated the presence of a piece of buried ferrous material.

Excavation began by removing the overburden, which was Layer 1 Level 1. Several large sandstone rocks believed to be the foundation stones, were mapped from the surface and left in place as excavation continued into Layer 2 Level 1. No artifacts were recovered from Layer 1. A layer change to Layer 2 was initiated when sediments become slightly more compacted and soil development noticeable. An additional four sandstone slabs were encountered in Layer 2 Level 1. A piece of a metal file and a flaked-tool, a biface, were recovered from this level while in the field and an additional flake was recovered in the lab from a control sample. In Level 2 soil development became slightly more developed but there were no distinctive sediment changes otherwise to suggest a stratigraphic break. No additional sandstone foundation rocks appeared in this level, but an increase in small while pebbles was noted. No artifacts were recovered from the field, but a single flaked-lithic was recovered in the control sample. A third level in Layer 2 was excavated for 10 centimeters before a stratigraphic break to Layer 3. Artifacts in this level included two flaked-lithics, which were recovered from the flotation/control sample along with charcoal and seeds. Charcoal was observed in the east wall and became rather in dense in places. A few new slabs were exposed in this level. A layer change to Layer 3 was initiated because sediments became much lighter in color and harder. Charcoal was concentrated in the southeast comer where a piece of worked bone was recovered at the contact between Layers 2 and 3. Charcoal decreased significantly in Layer 3 Level 1. In Layer 3 Level 2, the sediments continued much as they had in the preceding level with a slight decrease in the number of white pebbles. No artifacts were recovered from this level. The final level, Layer 3 Level 3, was very similar to the preceding level but with less pebbles and a more well-developed soil structure. No artifacts were recovered from this level, and excavations were terminated.

Four strata were defined in the north (south facing) and east (west facing) wall profiles (Figure 9.11) and they are discussed below.

Stratum I — Stratum I is a brown (10YR 5/3), silt loam with fine sand. The thickness of this stratum ranges from 4 to 13 cm. The soil structure is single grained with weak to no development. The stratum is represented by a clear, smooth and wavy lower boundary that includes bioturbation. The reaction to hydrochloric acid is moderate and the gravel content is slight (0 to 3%) and represented mostly by sandstone pebbles. Cultural inclusions include slabs that have been arranged in a foundation-like manner. No artifacts were recovered in this stratum.

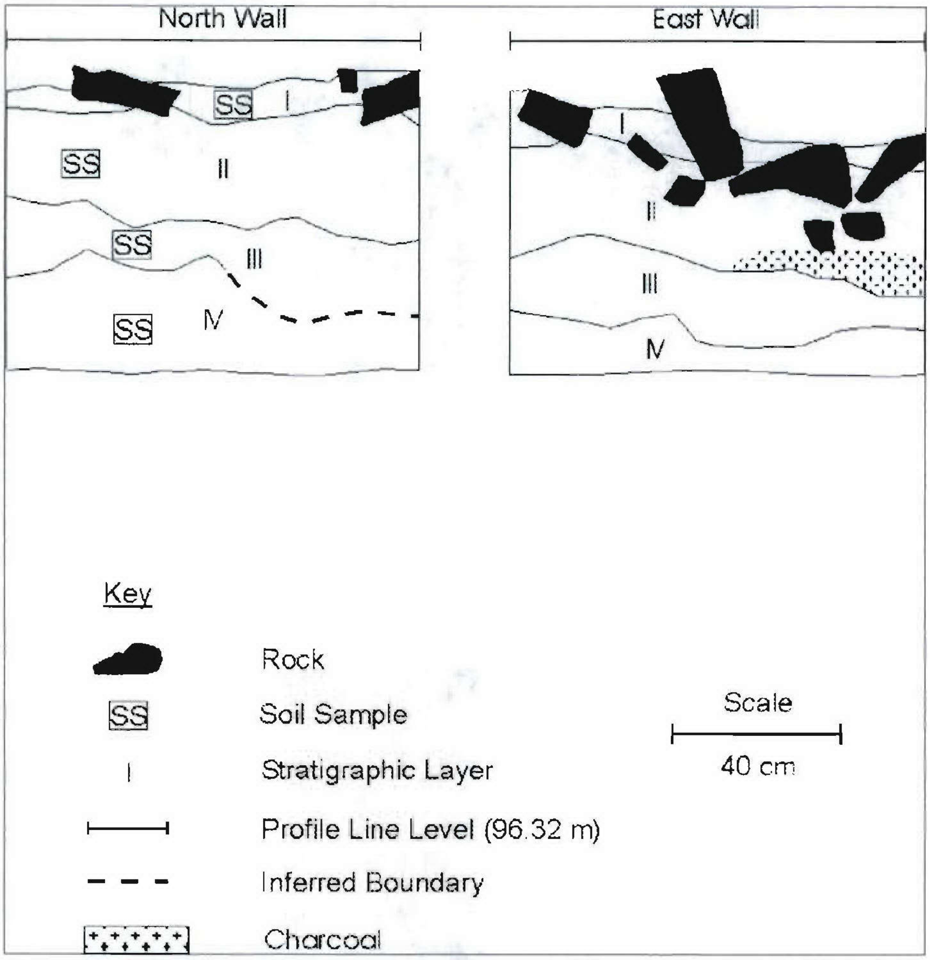


Figure 9.11. Test Unit 6, profiles, Area D.

Stratum II — Stratum II is also a brown (10YR 5/3) sandy silt, but contains more silt than Stratum I. This stratum is also thicker (20-32cm) and has a weak to moderate developed soil structure. The lower boundary is identical to Stratum I--clear, smooth and wavy. The reaction to hydrochloric acid is slight to moderate with a higher content of gravel (5-15%). Bioturbation is present throughout the stratum as well as a few artifacts. A charcoal lens that is at the contact of Stratum II and III is most likely cultural and associated with the historic occupation.

Stratum III — Stratum III is a yellowish brown (10YR 5/4), silt with sand that is 17 to 19cm thick. The soil structure is moderately developed with some loose silt. The lower boundary of the stratum is gradual and wavy. The reaction to hydrochloric acid is violent and no cultural inclusions are noted. The gravel

content is 3 - 10%. No artifacts were present in this stratum.

Stratum IV Stratum IV is a yellowish brown (10YR 5/4), fine sandy loam. The thickness of this stratum is at least 20 cm, but its lower boundary remains concealed. The soil structure is represented by blocky, moderately developed peds. The reaction to hydrochloric acid is violent. No natural or cultural inclusions were noted. The gravel content decreases from Stratum III to 0-3%.

This test unit was located inside of the sandstone foundation that likely represented a historic wall. Due to a perceived protrusion at the northeast corner, which was interpreted to be a possible entryway to a subterranean room such as a shallow dugout. The unit was excavated in three layers and seven levels; however, a fourth stratum was recognized in the profile walls. At the conclusion of the excavations, it was interpreted that this protrusion did not represent a ramped entry and that this structure was not a dugout. Cultural sediments were shallow and a break in strata between Stratum II and Stratum III probably represented the extent of the historic component. A few prehistoric artifacts were found in this test unit, but a buried prehistoric horizon or ethnostratigraphic layer was not identified. The charcoal lense noted during excavation of Layer 3 is suggested to be the remains of a historic hearth or clean out from a stove. A piece of worked bone was found in association with the charcoal. We now interpret this foundation to be the remains of a very shallow, temporary shelter, perhaps even a tent platform.

A flotation sample from Layer 2, Level 3 was processed in the lab at Fort Lewis College and the organic materials were submitted to High Plains Macrobotanical for analysis. The results of this analysis are presented in Appendix II. One piece of one-seed juniper charcoal was recovered from this historic feature along with uncharred whole and fragmented seeds of *Vicia* spp., *Convolvulus/pomea* spp., *Sitanion* ssp., *Chenopodium* spp. *Portulaca oleracea*, *Helianthus petiolaris* and unknown mustard seeds (Appendix II). All of these species are currently present in the area and some are considered to be invasive. Their presence almost assuredly reflects intrusion into the underlying sediments through processes of bioturbation.

A small trench was excavated between the two test units to try and establish a possible relationship between the stratigraphy in Test Units 5 and 6 (Figure 9.9). This trench measured 1.35 m long and .4 meters wide. It connects with Test Unit 5 on the northwest corner and Test Unit 6 on the southeast corner (Figure 9.12.). By connecting the two test units, it was hoped that the stratigraphic transition between Stratum II and Stratum III in Test Unit 6 was indeed a cultural horizon and therefore restricted to the interior of the feature. Excavations in this trench were conducted in three layers and four levels. No artifacts were recovered from the unit. After examining the profile stratigraphy it was established that Stratum II in Test Unit 5 thins toward Test Unit 6, but that it is of a natural origin and is not cultural. Similarly, Stratum III in Test Unit 6 did not continue into the trench although we did not see a clear boundary between the trench and the test unit, and this supports the earlier interpretation of a very shallow structure or perhaps tent platform.

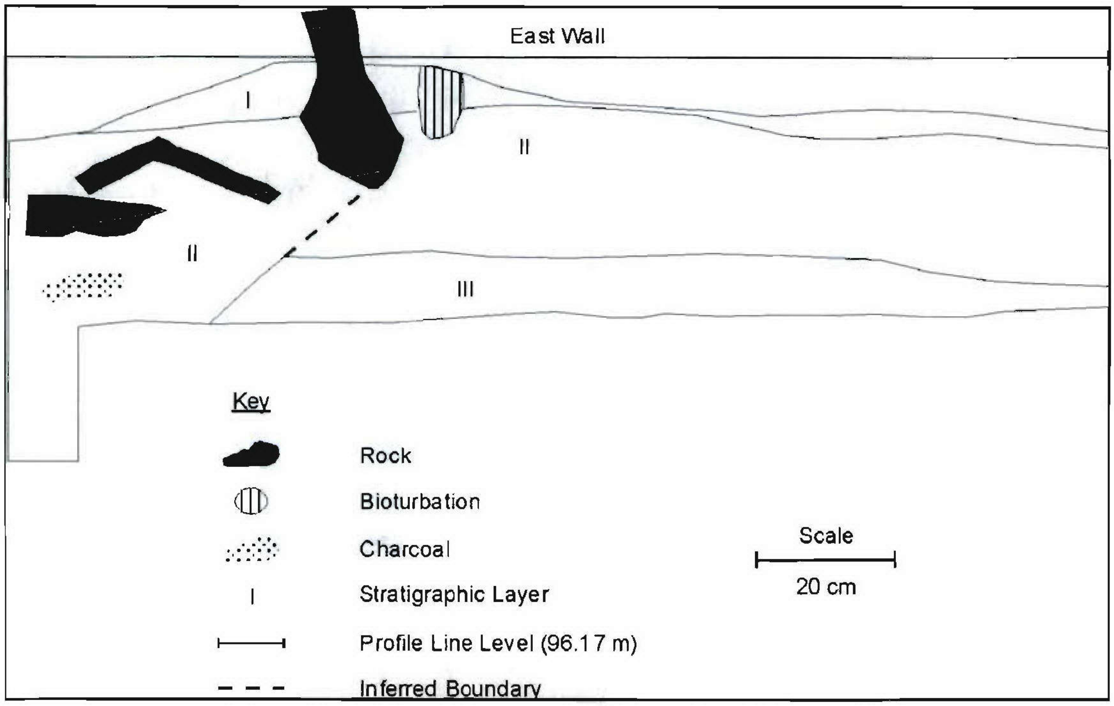


Figure 9.12. Trench between Test Units 5 and 6, Area D.

Table 9.8. Cultural materials recovered from Test Units 7, 8, and 9, Area D.

TU	Layer	Level	Thickness Range (cm)	Materials Recovered 1/4"	Materials Recovered Control/Flotation
7	1	1	3 - 15	no artifacts	no artifacts
7	2	1	5 - 10	2 flaked lithics	no artifacts
7	2	2	9 - 14	1 charcoal, 1 flaked lithic, 1 lithic tool	no artifacts
8	1	1	1 - 5	no artifacts	2 flaked lithics, 2 bone
8	2	1	6 - 10	no artifacts	no artifacts
8	2	2	10 - 11	1 bone, 1 flaked lithic	1 flaked lithic
9	1	1	0 - 4	no artifacts	2 flaked lithics
9	2	1	4 - 10	no artifacts	no artifacts
9	2	2	9 - 10	1 charcoal, 1 bone , 1 flaked lithic	no artifacts

Test Unit 7 Test Unit 7 was placed in an area that had a considerable number of surface artifacts. In Test Unit 7, the loose overburden (Layer 1) was removed to the contact with the developed soil beneath. No artifacts were recovered from this layer (Table 9.8). A layer change was initiated at this point to Layer 2. Two levels were excavated in Layer 2. Numerous roots and signs of other bioturbation were present in these levels. At the bottom of Layer 2, Level 1, angular sandstone began to appear (Figure 9.13). Two flaked-lithic

artifacts were recovered from the this level. In Level 2, a color change was noticed to a light brown, otherwise sediments were similar to Level 1. Bioturbation remained consistent from the preceding level, but the angular sandstone rocks increased. These rocks ranged from large pebble- to cobble-size and were concentrated in the western half of the unit. It was speculated at this time that these rocks represented a prehistoric feature of some type. Excavation was halted at this time in this unit. A charcoal sample, one flake and a lithic tool were recovered from this unit. This charcoal sample was submitted for standard AMS dating. The sample dated to 2660 ± 110 radiocarbon years BP (Beta 178251). The 2 sigma calendar corrected date is A.D. 550 to 660 with an intercept of radiocarbon age with calibration curve of A.D. 630 (Appendix III).

Figure 9.13. Use surface, Test Units 7, 8, and 9, Area D. View is to the east.

Test Unit 8 Test Unit 8 was placed to the west of Test Unit 7 to explore the possibility that the rock concentration exposed in Test Unit 7 continued. Like Test Unit 7, Test Unit 8 was excavated in two layers. Layer 1 consisted of the loose overburden and was identical to the sediments in Layer 1 in Test Unit 7. While no artifacts were recovered from the field screening, two flaked-lithic artifacts and two pieces of bone were recovered from control sample (Table 9.8). A layer change to Layer 2 was initiated when the sediments began to show signs of soil structure and the color changed slightly. Two levels were excavated in Layer 2. Bioturbation was extensive in these two levels. In Layer 2, Level 1, rocks began to show suggested that the rock concentration continued to the west. In Layer 2, Level 2, the sediments were extremely disturbed due to heavy bioturbation. Seven new rocks were

exposed at this level that definitely can be associated with the rock concentration in Test Unit 7. These rocks were concentrated in the southeast corner of the unit (Figure 9.13). While no artifacts were recovered from Layer 2, Level 1, two flaked-lithic artifacts and a piece of bone were recovered from Layer 2, Level 2.

Test Unit 9 A third test unit, Test Unit 9, was opened to the south of Test Unit 8. This test unit was excavated to try and follow the boundaries of the rock concentration identified in the preceding test units. This test unit was excavated similarly to the others. Layer 1 was the loose overburden. It was removed as a single layer and no artifacts were discovered in the field but waterscreening of the control sample produced a flaked-lithic artifact. When the soil began to display some structure, Layer 1 was discontinued. Layer 2 was excavated in two levels to what was defined as a prehistoric use surface. Artifacts were rare in these two levels and consisted of a piece of bone and a flaked-lithic artifact from Layer 2, Level 2. Excavations were terminated when we established that the bottom of Layer 2, Level 2 represented a prehistoric use surface.

Three strata were identified in these three test units that are joined in an L-shaped pattern. These strata were identified on the east (west facing) and north (south facing) wall profiles (Figure 9.14.). These strata are discussed below.

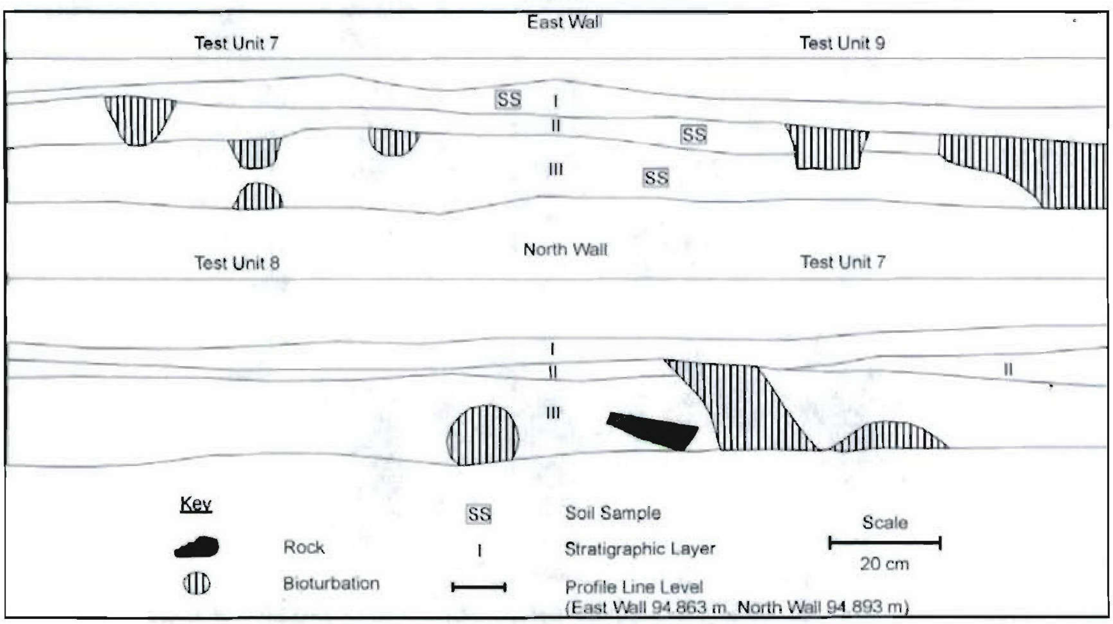


Figure 9.14. Test Units 7, 8, and 9, profiles, Area D.

Stratum I Stratum I is a brown (7.5YR 5/2), sandy silt. This thin stratum (2 to 7 cm thick) has a soil structure that is single grained to weakly developed with small subangular peds. The lower boundary is abrupt and broken by bioturbation and roots. The stratum reacts violently to hydrochloric acid and

calcium carbonate can be seen with the naked eye. The gravel content of the stratum is minimal (0-1%) and contains well-sorted angular sandstone. Artifacts are present in the stratum.

Stratum II — Stratum II is a brown (7.5YR 5/2), sandy silt that contains fine to coarse sand particles. The stratum is up to 8 cm thick and pinches out in certain locations. The structure of the stratum is moderately well developed and subangular to angular blocky. The lower boundary is abrupt and broken by bioturbation. The reaction to hydrochloric acid and gravel content are identical to Stratum I. Artifacts were also found within the stratum.

Stratum III — Stratum III is a pale brown (10YR 6/3), sandy silt that has an unknown thickness and concealed lower boundary. The soil structure is well developed to moderately well developed and angular blocky. The reaction to hydrochloric acid is violent and bioturbation and sandstone are present. The gravel content is 1% and artifacts increased in this stratum. A feature is contained within this stratum. The upper 17 cm of the stratum were exposed.

Stratum I essentially corresponded to Layer 1. Stratum II corresponded to Layer 2 Level 1 but also included the upper few centimeters of Layer 2 Level 2. For the most part Layer 2 Level 2 and Stratum III are the same stratum. Excavation of the three contiguous test units exposed a rock concentration, Feature 3, that is interpreted as a prehistoric thermal feature. It consisted of an arc of angular sandstone cobbles (Figure 9.13) and measured approximately 2 m x 2 m. The rocks were not lying flat but were tilted toward the feature's interior. Some of the rocks may have been fire cracked. A few flaked-lithic artifacts were associated with the feature and some of the bone may have been associated as well. Charcoal and light oxidation were present in one small area near the center of the feature. Charcoal from the feature was dated to A.D. 100–1050, which corresponds to the Developmental Period (Zier and Kalasz1999) or Eighmy's Early Ceramic Period (Eighmy 1984).

Material Culture

Prehistoric Artifacts

Sixty-five prehistoric artifacts were mapped on the surface. These include three ground stone, three projectile points, six flake tools and fifty-two flakes. Six flake tools, the projectile points, one flake, two ground stone fragments and the core were collected. Five-hundred and sixteen artifacts were collected from the subsurface. These include four projectile points, nine bifaces, eleven flake tools, two cores, nine groundstone and four-hundred and eighty-one non-tool flaked-lithic debitage. Various samples were also collected.

Flaked-lithic Artifacts

Projectile Points Seven projectile points were recovered from archeological investigations in Area D (Figure 9.15).

The first four projectile points discussed are considered to be similar based on characteristics such as broad triangular blades and short slightly convex bases. These four

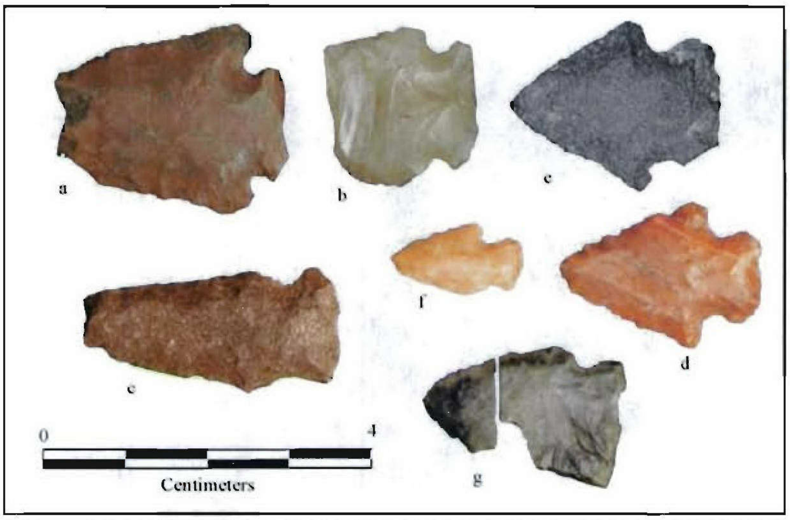


Figure 9.15. Projectile points from Area D: a) 5LA3421.105.087; b) 5LA3421.105.796; c) 5LA3421.105.855;d)5LA3421.105.077; e) 5LA3421.105.086; f) 5LA321.105.795; g) 5LA3421.106.053.

projectile points best resemble those identified as Category P35 from Lintz and Anderson (1989: 153-155). Three radiocarbon dates from two sites at the PCMS (5LA5305 and 5LA5249) associated with deposits containing Category P35 points dated from A.D. 780 to A.D. 1100. Based on comparisons made in Lintz and Anderson (1989: 155) this category is placed in a much broader time frame spanning from 1000 B.C. to A.D. 1200.

5LA3421.105.086 This specimen was collected from the surface (Figure 9.15 and Figure 9.16.). It is a large expanding-stemmed projectile point made from basalt. This projectile point is nearly complete except for missing the very tip of one tang. Characteristics include a sharp tip, a broad triangular blade with one slightly concave edge and one straight to slightly convex edge, weakly barbed shoulders, a broad slightly expanding stem, a rounded tang, a slightly convex base, and is bi-convex in cross-section. A similar projectile point (5LA7357.0.13) recovered from the PCMS is reported in Owens et al. (2000: 286). Another similar specimen (5LA6580.01) reported in Loendorf and Loendorf (1999: 65) was classified as Category P42 (Lintz and Anderson 1989: 160-162) and is characterized by generally more pronounced shoulder barbs. A third similar specimen (5LA2405.0.0185) reported in Loendorf et al. (1996: 49) was classified as Category P36 (Lintz and Anderson 1989: 155-156). A single carbon sample from a hearth at 5LA2405 dated to A.D. 30 +/- 70. Specimen 5LA3421.105.086

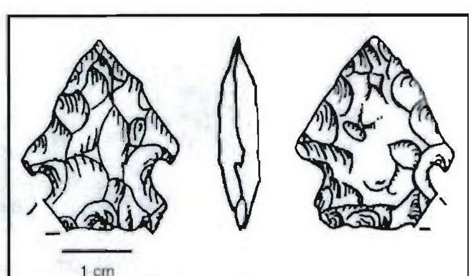


Figure 9.16. Projectile point, Area D. 5LA3421.105.086.

appears to be most similar to Category P35 and is placed within a time frame spanning from 1000 B.C. to A.D. 1200 (Lintz and Anderson 1989: 155).

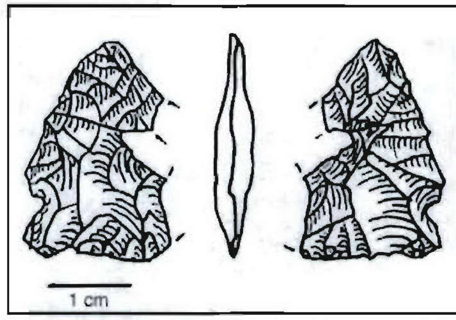


Figure 9.17. Projectile point, Area D. 5LA3421.106.053.

5LA3421.106.053 This specimen was recovered from Test Unit 4, Layer 3 Level 5 (Figure 9.15 and Figure 9.17.). It is a large expanding-stemmed projectile point manufactured from heavily patinated black chert. This specimen is not complete and consists of two separate pieces that refit. Part of the blade, one shoulder, and one tang are missing from one side. From what remains, this specimen possesses a sharp tip, a broad triangular blade with a slightly convex to straight blade edge, a weakly barbed shoulder, a broad slightly expanding stem, slightly pointed tangs, a slightly convex base, and is bi-convex in cross-section. This artifact is most similar to Category P35 and is placed within a time frame spanning from 1000 B.C. to A.D. 1200 (Lintz and Anderson 1989: 155). A carbon sample collected from sediments not in association with, but underlying this specimen, produced a calibrated date of 1030 B.C. to 520 B.C. (Beta - 178251).

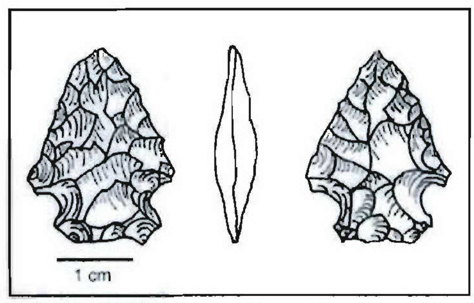


Figure 9.18. Projectile point, Area D. 5LA3421.105.077.

5LA3421.105.077 This specimen was collected from the surface (Figure 9.15. and Figure 9.18.). It is a large expanding-stemmed projectile point made from a red banded chert. This projectile point is complete exhibiting a sharp tip, a broad triangular blade with straight blade edges, abrupt shoulders, a broad slightly expanding stem, rounded tangs, a slightly convex base, and is bi-convex in cross-section. This specimen is most similar to Category P35 and is placed within a time frame spanning from 1000 B.C. to A.D. 1200 (Lintz and Anderson 1989: 155).

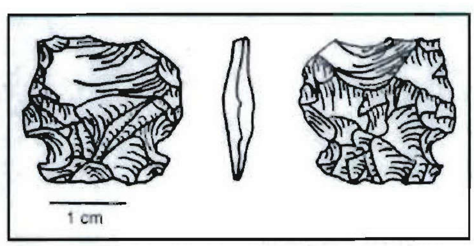


Figure 9.19. Projectile point, Area D. 5LA3421.105.796.

5LA3421.105.796 This specimen was recovered from Feature 2, Test Unit 2, Layer 2 Level 2 (Figure 9.15 and Figure 9.19). It is considered to be a large expanding-stemmed projectile point made from a light brown chalcedony. Based on the angle of the blade edges, at least the top third of this specimen is missing. The tip of one tang is also absent. Fracture scars on the blade suggest that it may have broken upon impact. From what remains it appears that the broad triangular blade had slightly convex to straight blade edges, weakly barbed shoulders, a broad slightly expanding stem, slightly pointed tangs, a slightly convex base, and is bi-convex in cross-

section. This artifact is most similar to Category P35 and is placed within a time frame spanning from 1000 B.C. to A.D. 1200 (Lintz and Anderson 1989: 155). A carbon sample collected from sediments not in association with, but underlying this specimen, produced a calibrated date of A.D. 990 - A.D. 1160 (Beta - 178246).

5LA3421.105.795 This specimen was recovered from Feature 2, Test Unit 2, Layer 2 Level 2 (Figure 9.15 and Figure 9.20.). It is a small expanding-stemmed projectile point made from a pink and tan colored chert. It is complete and asymmetrical in shape. One shoulder is abrupt while the other is rounded. The artifact has a sharp tip, an elongated triangular blade, slightly convex to straight blade edges, slightly expanding stem, rounded tangs, a slightly convex base, and is bi-convex in cross-section. This projectile point best resembles those identified as Category P65 and P66 (Lintz and Anderson 1989: 198-200). Two similar projectile points (5LA3491.0.0369 and 5LA3491.0.287) recovered from the PCMS and reported by Loendorf et al. (1996: 89) were classified as Category P62 (Lintz and Anderson 1989: 193-196). These specimens are similar in shape but are larger with more pronounced shoulders. Radiocarbon samples from 5LA3491 date from A.D. 682 to A.D. 999 (Loendorf et al. 1996:119). This specimen is most similar to Category P65 and P66. No absolute dates are currently associated with Category P65 but Lintz and Anderson (1989:199) suggest that this category tentatively dates to A.D. 800 to A.D. 1100. Based on two radiocarbon dates from one site (5LA5255) at the PCMS and comparisons to other sites in the region Lintz and Anderson (1989:200) date Category P66 to A.D. 800 to A.D. 1450. A carbon sample collected from sediments not in association with, but underlying this specimen, produced a calibrated date of A.D. 990 - A.D. 1160 (Beta - 178246).

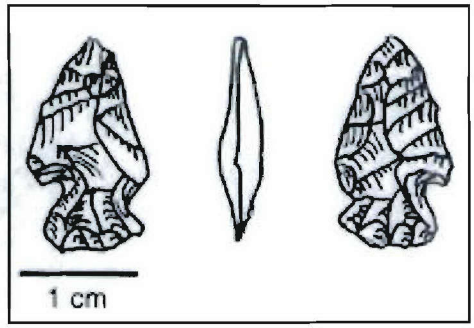


Figure 9.20. Projectile point, Area D. 5LA3421.105.795.

5LA3421.105.087 This specimen was collected from the surface (Figure 9.15 and Figure 9.21). It is a large expanding-stemmed projectile point manufactured from a red banded chert. It is nearly complete, missing only the tip of the blade. This specimen has a broad, elongated triangular blade with straight to slightly expanding blade edges. Other characteristics include barbed shoulders, a broad slightly expanding stem, pointed tangs, a straight base (with some edge damage) and is bi-convex in cross-section. This projectile point best resembles those identified as Category P26 and P42 (Lintz and Anderson 1989: 142-143, 160-162). The shape of Category P26 is similar although generally larger, while the characteristics of Category P42 are similar but have much more pronounced shoulders.

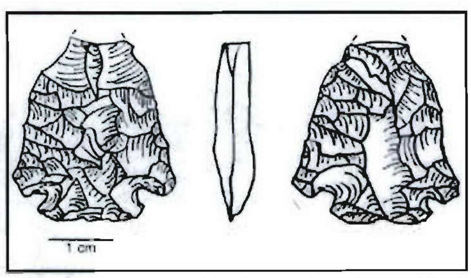


Figure 9.21. Projectile point, Area D. 5LA3421.105.087.

A similar specimen (5LA6875.0.1) recovered from the PCMS and reported in Loendorf and Loendorf (1999: 72) was classified as Category 58 (Lintz and Anderson 1989: 184-187). However, Category P58 is smaller in size and considered a small expanding-stemmed projectile point. No dates for Category P26 are available from the PCMS. Based on comparisons made in Lintz and Anderson (1989:143) this category dates from 1000 B.C. to A.D. 500, but may persist as late as A.D. 1400. One radiocarbon date of 3590 +/- 90 B.C. from 5LA5264 is indirectly associated with Category P42 (Lintz and Anderson 1989: 161). The specimens association with the date was considered questionable and thought to be younger. Other comparisons by Lintz and Anderson (1989:161-162) suggest that Category P42 dates between A.D. 600 to A.D. 1600.

5LA3421.105.855 The specimen was collected from Test Unit 3, Layer 1 Level 1 (Figure 9.15 and Figure 9.22.). It is a large expanding-stemmed projectile point made from a dark purple fine-grained quartzite. This projectile point is nearly complete except that the very tip of the blade is missing. This point has a long, narrow blade with one slightly concave edge and one straight edge. Other characteristics include, rounded shoulders, an expanding stem, pointed tangs, a convex base and is bi-convex in cross-section with a slight twist. This projectile point best resembles those identified as Category P9 and P10 (Lintz and Anderson 1989: 123-126). Category P9 is characteristically the best comparison, although it has a straight base as opposed to a convex base. The shape of Category P10 is similar, but is generally larger. A similar specimen (5LA7400.0.9) recovered from the PCMS and reported in Owens et al. (2000: 255) is similar, although somewhat smaller in size. It is classified as Category P25 (Lintz and Anderson 1989: 141-142) and is characterized by more abrupt shoulders and a greatly expanding ("rocker") base. Another similar specimen (5LA6862.01) reported in Loendorf and Loendorf (1999: 71) was classified as Category P68 (Lintz and Anderson 1989: 201). A point from this category (5LA5468.11) is a good match (Lintz and Anderson 1989:304.u) but is much smaller. No dates for Category P9 are available from the PCMS. As suggested by Lintz and Anderson (1989:124), this category needs more refinement in regards to age. Comparisons made suggest a very wide range from 3300 B.C. to A.D. 1000. This specimen may represent a hafted drill, but there is no evidence of use wear on the blade.

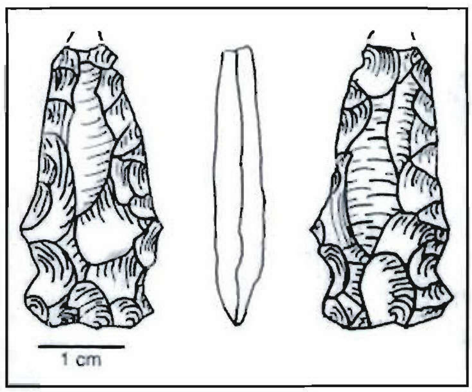


Figure 9.22. Projectile point, Area D. 5LA3421.105.855.

Quantitative data on the projectile points was collected during the lab. These data include material type, measurements, and weight as well as reference information (Table 9.9). Measurements were not taken on broken or incomplete elements (Dean 1992). Weights were recorded for all specimens to the nearest tenth of a gram.

Table 9.9. Projectile point data, Area D.

	5IA3421.105.087	5LA3421.015.796	5LA3421.105.855	5LA3421.105.077	5LA3421.105.086	5LA3421.105.795	5LA3421.106.053
Raw Material Type	Chert	Chalcedony	Quartzite	Chert	Basalt	Chert	Chert
Weight (gm)	3.6	1.4	3.0	1.6	2.2	0.3	1.4
Length (mm)*	0	0	0	24	25	16	24
Width (mm)*	23	19	15	18	20	9	0
Thickness (mm)	6	4	5	5	5	3	4
Stem width (mm)*	12	13	12	9	13	5	0
Base width (mm)*	13	15	14	11	15	6	0
Stem length (mm)	4	5	7	5	7	4	5
Haft length (mm)	5	6	8	7	8	5	6

* No measurement on incomplete elements

Bifaces All nine biface/biface fragments were recovered from subsurface deposits at Area D. Five of these artifacts were collected from Test Unit 3. Four of the specimens in Test Unit 3 were in Layer 1, Level 2. Two were recovered from the flotation sample. One of these artifacts consists of a gray fine-grained quartzite triangular shaped complete flake. Both sides have been bifacial thinned and the artifact may represent an unfinished preform. The other three fragments are quite small but may be originally parts of projectile points. These include one light brown chert point tip, the pointed tang of a light brown chert point base, and a small portion of a white chert blade margin. The fifth biface fragment in Test Unit 3 was in Layer 1 , Level 3. This chalcedony biface fragment is a roughly oval shaped unfinished biface.

Two biface fragments were recovered from Test Unit 4. One basalt specimen from Layer 3, Level 1 appears to be part of a broad triangular blade. The other biface fragment was found in Layer 3, Level 3. This artifact represents the remains of a light gray fine-grained quartzite projectile point that is too fragmentary to classify. A portion of one shoulder and part of the blade are all that's left. The blade appears to have straight to slightly convex edges. The base is snapped off at the hafting element and the blade tip appears to have been broken by impact.

A large a light gray biface fragment was collected from Layer 2, Layer 1 in Test Unit 6. This artifact is a very large unfinished biface made from a gray fine-grained quartzite with convex and asymmetrical blade edges. The proximal end is broken. The ninth and final biface to be discussed is a very small fragment from Layer 2, Level 2 from Test Unit 7. This

artifact represents a small portion of a clear quartz blade margin.

Flake Tools Seventeen flake tool artifacts were collected from Area D. Six artifacts were surface finds and the remaining eleven tools were from subsurface deposits. Subsurface tools include one in Shovel Test Pit 5, one in Test Unit 1, two in Test Unit 2, four in Test Unit 3, and three in Test Unit 4. Chert (7) is the most dominant raw material type used for flake tools. Other identified raw material types include quartzite (6), basalt/hornfels (3), and limestone (1). The only patterned flake tools of note are two end scrapers and one flake perforator. A patterned flake tool is considered a flake tool with predominately unifacial flaking and with a form created by the maker. Both scrapers have unimarginal retouching with both bimarginal and unimarginal use wear. The perforator has both bimarginal retouching and use wear.

The remaining fourteen flake tools are more expedient in nature. Seven flake tools have either retouching or use wear only. Three flakes have unifacial retouching , one flake has bimarginal and unimarginal retouching, one flake has bimarginal retouching , one flake has bimarginal and unimarginal use wear, and one flake has bimarginal use wear. Seven flakes have a combination of both retouching and use wear. Three flakes have unimarginal use wear and unimarginal retouching, two flakes have unimarginal use wear with bimarginal and unimarginal retouching, one flake has bimarginal and unimarginal use wear with unimarginal retouching, and one flake has bimarginal use wear and unimarginal retouching.

Cores Three core/core fragments were recovered from Area D. One purple fine-grained quartzite core fragment was collected from the surface. Cortex is not present. This artifact has two striking platforms and three flake scars. Based on size and other attributes it appears that little of the original core is present. The other two cores were found during subsurface testing. One multicolored chert pebble core was collected from Layer 2, Level 3 in Test Unit 3. This specimen has three striking platforms and a few flake scars. Roughly 30% of the cortex remains. The small size of this artifact suggests that core is nearly exhausted. The other core fragment was found fairly deep in Test Unit 4, roughly 50 cm bgs in Layer 3, Level 4. This fragment was originally part of a small waterworn siltstone pebble. This specimen has two striking platforms and a few flake scars. The percentage of cortex is slightly more than 50%. This artifact has evidence of use as a tool with unifacial use wear along one broken edge.

Flaked-lithic Debitage Of the four hundred and eighty-two non-tool flaked-lithic debitage collected from Area D (1 flake collected from surface), the majority (79.5 %) are broken flakes, while ninety-nine (20.5 %) are complete flakes. Fifty-one flakes were analyzed in the field and left in place. Additional quantitative data from surface and subsurface lithics have been combined and are presented in Table 9.10. Small flake sizes predominate, as do shatter and simple flakes. Complex flakes are less predominant and bifacial thinning flakes are minimally represented. The majority of these specimens (89.5 %) lack cortex. In general, the data illustrates the prevalence of small sized simple flakes and shatter with cortex absent. These data suggest that early to intermediate stage lithic reduction activities occurred at the site. The smaller percentage of complex and bifacial thinning flakes present suggest that late stage reduction activities also occurred, but were less common.

Table 9.10. Quantitative data on surface and subsurface debitage, Area D.

	Hornfels/basalt	Orthoquartzite	Chert	Chalcedony	Silicified Wood	Argillite	Obsidian	Other	Total (%)
					Size				
>1	3	7				1		4	15 (2.8)
1-1/2	29	48	20	1	1	13		4	116 (21.8)
<1/2	73	140	152	2		22	2	11	402 (75.4)
Total (%)	105 (19.7)	195 (36.6)	172 (32.3)	3 (0.6)	1 (0.2)	36 (6.7)	2 (0.4)	19 (3.5)	533 (100)
					Flake Type				
Shatter	60	53	64		1	19		9	206 (38.7)
Simple	30	106	59	2		15		4	216 (40.5)
Complex	13	34	39	1		2	2	6	97 (18.2)
Bifacial Thinning	2	2	10						14 (2.6)
Total (%)	105 (19.7)	195 (36.6)	172 (32.3)	3 (0.6)	1 (0.2)	36 (6.7)	2 (0.4)	19 (3.5)	533 (100)
					Cortex				
Present	16	8	15			11		6	56 (10.5)
Absent	89	187	157	3	1	25	2	13	477 (89.5)
Total (%)	105 (19.7)	195 (36.6)	172 (32.3)	3 (0.6)	1 (0.2)	36 (6.7)	2 (0.4)	19 (3.5)	533 (100)

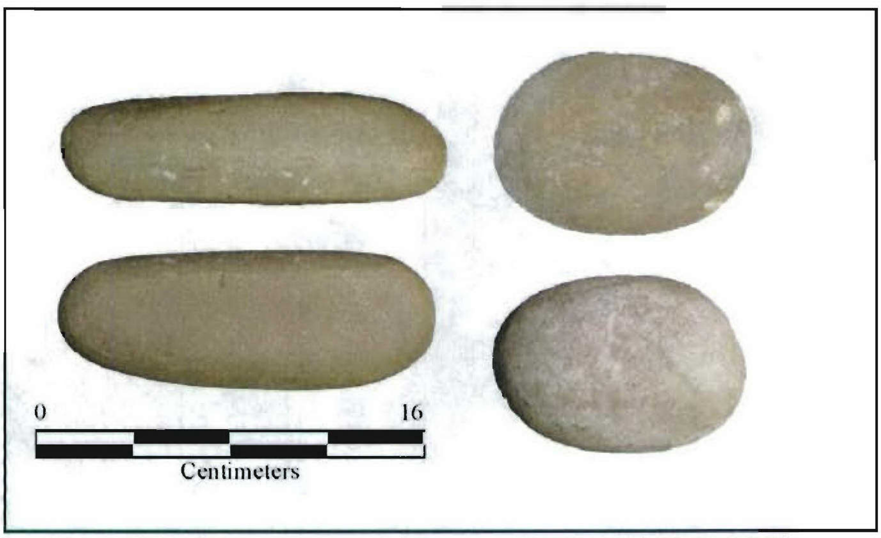


Figure 9.23. Manos recovered from Area D: a) 5LA3421.106.062, b) 5LA3421.016.955.

Ground Stone

Eleven pieces of ground stone were collected from Area D. The ground stone assemblage is composed of five manos, four unknown grinding slabs, one abrader and one hammerstone. Raw material type preference is for sandstone (81.8 %). One granite and one quartzite specimen was also recovered. Three of these specimens are complete and the remaining eight are represented by fragments of 50 % or less of the original specimen. The complete specimens include two of the manos and the hammerstone. The complete manos (Figure 9.23) are represented by one-handed specimens constructed of well-rounded, water-worn cobbles. One mano has a single use surface, while the other exhibits at least two

opposing use surfaces. Both specimens exhibit additional battering along the edges. Quantitative data for all ground stone specimens is presented in Table 9.11. Measurements are provided in centimeters.

Table 9.11 Quantitative data for ground stone, Area D.

F.S.	Material Type	Ground Stone Type	Condition	Number of Surfaces (mano)	Preperation (metate)	Length	Width	Thickness	Battering
5LA3421.105.930	Sandstone	Mano	<50%	Unifacial					Present
5LA3421.105.084	Sandstone	Unknown Grinding Slab	<50%		Pecking				
5LA3421.105.834	Sandstone	Abrader	<50%						
5LA3421.105.848	Sandstone	Unknown Grinding Slab	<50%						
5LA3421.105.955	Sandstone	Mano	Complete	Unifacial		10.2	6.9	5	Present
5LA3421.105.944	Granite	Mano	<50%	Bifacial					Present
5LA3421.106.038	Sandstone	Unknown Grinding Slab	<50%		Pecking				
5LA3421.106.037	Quartzite	Hammerstone	Complete			7	5.3	4.8	
5LA3421.106.062	Sandstone	Mano	Complete	Bifacial		14.4	5.3	4.2	Present
5LA3421.105.083	Sandstone	Mano	<50%	Bifacial					Present
5LA3421.105.775	Sandstone	Unknown Grinding Slab	<50%		Pecking				

Wood Sample

One wood sample was collected from Layer 2, Level 1 in Test Unit 4. The sample consists of a partially burned branch fragment and weighs 0.6 g.

Shell

Three shell fragments were recovered from Test Unit 2 in Layers 1 and 2 for a total weight of 0.3 g. These are unidentified mollusk shell fragments.

Bone

The faunal assemblage from Area D contained 19 bones–9 identifiable and 10 unidentifiable. Seven bones display signs of polishing, and a countless number of fragments from control and floatation samples show signs of burning. No domesticates were recovered from this area, and besides some bones being grouped into the groups of small and large mammals, only the order of Rodentia is represented (Appendix VI)

Bone Bead

Two prehistoric bone beads were found in Test Units 2 and 3 (Figure 9.24.). The bead from Test Unit 2 was found in Layer 2, Level 4. This is a complete bone bead with a cutmark on on end. It measures 16 mm x 5mm x 4mm. The bead is manufactured from a small- to medium size animal but the taxon is unidentifiable. The second specimen is so small (5 mm x 2mm) that it is difficult to determine whether it is simply a piece of worked bone or if it represents a fragment of a bone bead. The wear patterns and possible polishing on the ends suggest that it is a bone bead. The taxon is unidentified. It was recovered from Layer 1, Level 3 in Test Unit 3.

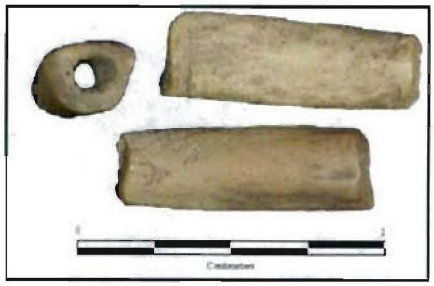


Figure 9.24. Bone bead recovered from Area D: 5LA3421.105.

Ceramic

A single sherd was recovered from Test Unit 2, Feature 2 in Area D (Figure 9.25). The sherds were analyzed by Dr. Richard Krause. This sherd measures 12 mm x 14 mm and is 5 mm thick. It is a mass modeled, grit tempered upper body sherd with floated exterior and interior surfaces. The exterior is vertically cord-roughened with a 2 strand S- twist fiber. A reddish coloring agent was applied to the interior surface prior to firing (Richard Krause, personal communication 2003).

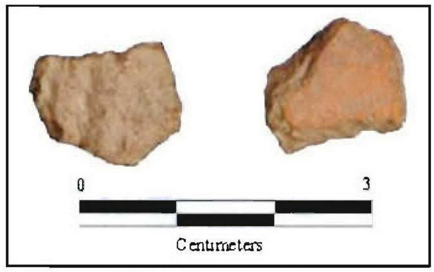


Figure 9.25. Prehistoric ceramic recovered from Area D: 5LA3421.106.123.

Historic Artifacts

Two historic artifacts were recovered from Area D. These include the fragment of a metal file and a chip of glass. The file was found in Layer 2, Level 1 of Test Unit 6, which was excavated in Feature 1, the only historic feature tested in Area D. The metal file fragment has been broken at either end leaving approximately 7.5 cm of the midsection. It is rectangular in cross-section, measuring 24 -x- 5 mm. Similarities to modern files, looking at shape, teeth spacing and type of cut, suggest this specimen to be a single cut, bastard file, commonly referred to as a mill bastard file. These tools are general purpose files that produce a coarse finish and are commonly used to sharpen other metal tools. The single glass chip is of solarized purple glass and was recovered from the first level in excavated in Test Unit 4. This is a relatively small specimen, recovered from $^{1}/_{16}$ inch wet screening, probably derived from a bottle.

Summary and Conclusions

Investigations in Area D consisted of surface inventory and field analysis of flaked-lithic artifacts, a gradiometer survey of four 20 m x 20 m grids, nine 1 m x 1 m test units and twelve shovel tests. This area demonstrated the most potential for deeply buried artifacts and features than any portion of the site.

The historic component at Area D, which is located along a terrace on the north side of Big Water Arroyo, possessed a stone foundation (Feature 1) and a dry-laid stone enclosure (corral). This enclosure is associated with a low stone wall along the edge of the sandstone rim and beneath the sandstone ledge at the east end of the site. Our investigations showed that the foundation contained shallow deposits with very few artifacts and no definite floor or occupation surface. The superstructure was probably ephemeral. It is possible that the foundation represents a base for a superstructure such as a tent or some type of fabric awning and likely represents a short-term domicile related to ranching or sheep-herding. Whether it was associated with the larger Leplatt homestead across the arroyo remains uncertain. A geophysical survey of an area 1600 m² circumscribing the foundation showed very few metal artifacts associated with this historic component. The few ferrous anomalies that were recognized in the database consisted of pieces of barbed wire, some of which were wrapped around boulders. A single ferrous anomaly within the foundation was identified through excavation as a piece of a metal file.

The stone wall and stone enclosure are likely associated with sheep-herding/ranching and could be as old as the late 19th or early 20th century. There were no artifacts visible on the surface that were in association with the wall or enclosure. It is probable that the wall, enclosure, and stone foundation are related and they represent activities involving sheep herding or ranching on the PCMS. Archeological investigations in this historic component demonstrated that this portion of the site hold little scientific value aside from the information already collected through these surface and subsurface investigations.

The prehistoric component on the other hand, is quite rich in material culture and site furniture and it is recommended that the prehistoric component has potential to yield significant information on the themes of geoarcheology, paleoenvironment, settlement and subsistence in the PCMS (Andresfky 1988:VIII-1 - VIII-37; Zier and Kalasz 1999). The depth of cultural deposits extends to at least 70 cm in portions of the site and could possible date to the Middle Archaic, although no diagnostic artifacts were recovered from the stratum that dates to this period. The possibility of a buried prehistoric component is recognized. The basis for this statement lies in the recover of flaking debris from the strata that dates to 5,800 BP and the presence of a paleosol in the same general stratigraphic layer. The paleosol was recognized from the magnetic susceptibility samples as an increase in the amount of remnant magnetism generally associated with A soil horizons.

Excavations in Test Unit 4 beneath the rock shelter provided evidence of a Late Archaic component. Charcoal samples from Levels 5 and 6 of Layer 3 were combined and submitted for a standard radiocarbon date. The conventional radiocarbon age is 2660 ±110 BP was received on this sample. The calendar correct 2 sigma date is 1030 to 520 B.C. and the intercept of radiocarbon age with calibration curve is 820 B.C. No diagnostic artifacts were recovered from this test unit. Artifacts that were recovered consisted of flaking debris, flaked-lithic tools, and an unusual mano. The sediments in this unit were dark gray and probably represent midden type deposits from the occupation of the rock shelter.

In another portion of Area D, excavations of Test Unit 7, 8 and 9 uncovered a rock feature, most likely a hearth or roasting feature. Charcoal obtained from the feature dated

to 2660 ± 110 radiocarbon years BP with a 2 sigma calendar corrected date of A.D. 550 to 660 with an intercept of radiocarbon age with calibration curve of A.D. 630. This feature was buried rather shallowly and shovel tests in the immediate area showed artifacts continued to a depth of greater than 70 cm. Artifacts associated with the hearth feature were few and no diagnostic artifacts were recovered. The date obtained from this feature places use of this feature during the middle of the Developmental Period.

Other outcomes from the testing in Area D identified a buried structure that may represent a short-term habitation feature. This rock structure or enclosure (Feature 2), was identified from the surface but extends for several centimeters and abruptly ends suggesting the presence of a use surface. Artifacts recovered from a test excavation within the feature consisted of two projectile points, flaked-lithic tools, flaking debris, one bone bead and one pottery sherd. The presence of corn agriculture is implied through the identification of *Zea mays* pollen. Charcoal collected from the test unit was processed and produced a conventional radiocarbon age date of 990±40 BP (Beta-178246). The 2 sigma calibrated radiocarbon age of A.D. 990 to 1160 with an intercept date of A.D. 1020. This date corresponds nicely with the projectile points and the presence of maize. This component then is placed within the latter part of the Developmental Phase.

Evaluative testing in Area D identified that this portion of the site possesses a long prehistoric record, perhaps dating to the Middle Archaic Period and into the Late Prehistoric Period. The abundance of artifacts, the exposure of two buried features, the presence of charcoal for radiometric dating and a buried paleosol were identified from a small amount of testing conducted in this area. Some of the features are shallowly buried and in danger of being compromised through continued military maneuver.

CHAPTER 10
GEOARCHEOLOGY

INTRODUCTION

Shuldenrein (1985) divided the physiography of the PCMS into four major landscape settings and eight landform categories. Site 5LA3421 is located on an alluvial terrace within the steppe landscape unit. The steppe landscape unit is the level to slightly sloping grasslands and mixed pinyon and juniper forest that covers most of the PCMS. The site is located on a large alluvial plain separated by a tributary of Big Water Arroyo, which flows west to east along the southern site boundary (Figure 10.1). The topography is flat with

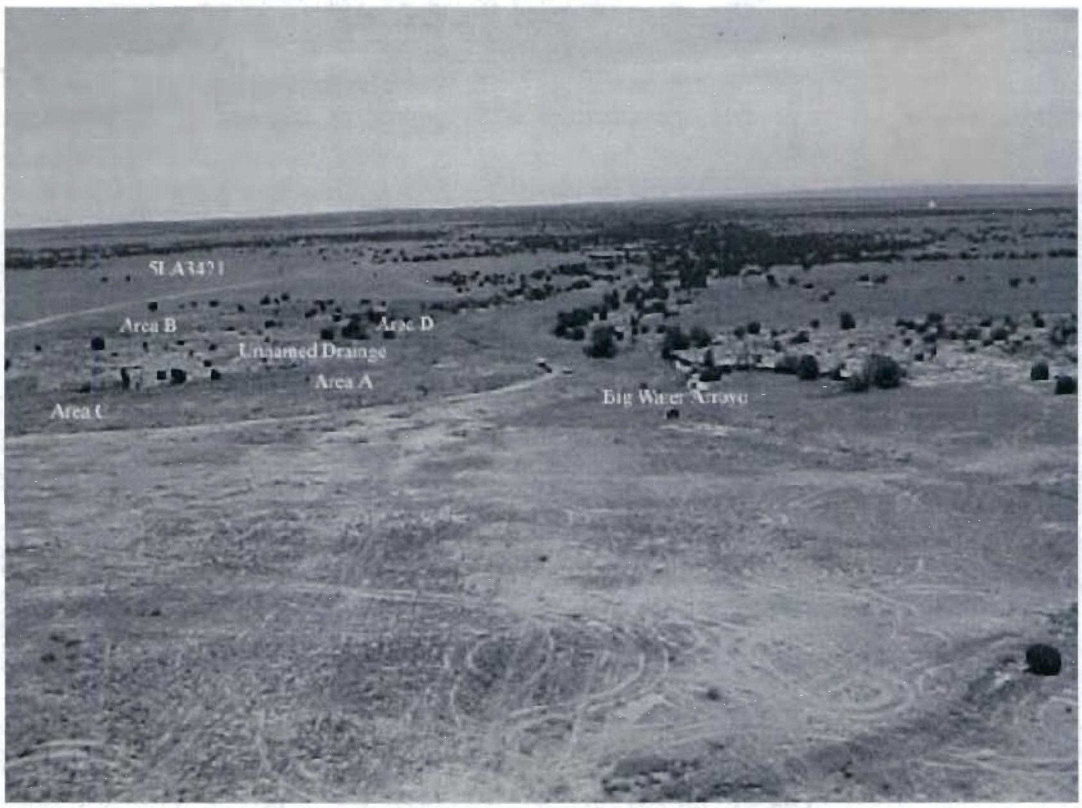


Figure 10.1. Overview of 5LA3421with major landforms identified.

minor undulations and low sandstone outcrops. The land dips gradually to the south into Big Water Arroyo and east or west into an unnamed intermittent tributary Big Water Arroyo is an intermittent tributary of Taylor Arroyo. A small unnamed drainage bisects the site and separates Areas A and C from Areas B and D. This drainage enters Big Water Arroyo at the south end of the site. Area B is located on a low bedrock outcrop of Cretaceous Sandstone. This outcrop directs the flow of Big Water Arroyo around the site. Below the sandstone shale is visible where it has been exposed through downcutting of the arroyo. The historic

homestead is situated on a low rise which gives the appearance of a small mound that can be seen from a short distance. Area C to the north of the homestead is quite flat with little topography. Area D sits on a slightly higher terrace and is nestled between Big Water Arroyo and the Cretaceous Sandstone outcrop of Area B.

The soils in this area are primarily Ustollic Haplargids (Schuldenrein 1985:69). These soils are aridisols with some clay in the B horizons. They are easily eroded and provide most of the sediments for the alluvial fills. These soils are both calcareous and montmorillonitic, especially if they have developed on shale bedrock. They possess a thin A horizon that overlies a B horizon that is often subtle and diffuse (Schuldenrein 1985:69). The soils are fairly recent and may represent much of the upper Quaternary.

Limited test excavations were conducted in all areas of the site by FLC with the exception of Area B, which is on sandstone bedrock. These excavations exposed lithostratigraphic, pedostratigraphic and ethnostratigraphic units in profile. These exposures were examined by Dr. Mary Gilliam, a geomorphologist from Durango, Colorado. Dr. Gillam's comments about the site geomorphology are combined with interpretations made by the principal investigator and the archeologists working the site to bring together a synthesis of the geoarcheology (Dr. Mary Gillam, personal communication 2002). A deep stratigraphic profile located on the south bank of Big Water Arroyo that had been excavated by David Khuen of NMSU was reexamined by Dr. Gillam and the principal investigator and their interpretations are presented in this chapter. Finally, magnetic susceptibility samples collected from the cut bank profile on the south bank of Big Water Arroyo as well as those from Test Unit 3 in Area D demonstrate the presence of buried paleosols. These paleosols support the interpretations that buried cultural components were associated with landscape stability.

Area A

The area between Big Water Arroyo and the unnamed tributary comprises Areas A and C. Area A represents the historic component at the south end of the site. Area C is the prehistoric component to the north. Area C is positioned along a low rise and is about the highest point along this alluvial plain. The surface sediments at the historic component are eolian, mostly silt (loess), although this area is not a loess plain. Area A contains evidence of overbank flooding of Big Water Arroyo. The rapidity of such flooding is well represented in the profile in the middle of the dugout (Feature 3). The floor of the dugout is covered by very rapid accumulations of alluvial deposits. These deposits exhibit clear bedding, some of which are graded. The lower deposits possess some historic artifacts including a pair of shoes. Over these deposits is a thick deposit (perhaps a single flood event) of silt that exhibits definite pedogensis. This deposit is followed by a thick layer of historic (10-20cm) trash that is mixed with silt. Some slight eolian sediments may be mixed with the alluvial deposits. The dugout must have fallen into disuse or was catastrophically destroyed (there is some indication of fire on the floor). The large depression then served as a catchment

basin for refuse, probably concomitant with or just after abandonment. Then the depression was allowed to fill in until someone dumped trash again into the dugout. The lowest trash appears to belong to the period around the early 1900's through early 1920s era, but when and who put the upper trash in the dugout remains uncertain. Possibly it was Henry Le Platt, the homesteader, or a subsequent landowner, or possibly, but less likely, the army.

Bioturbation is present across the site making all profile interrupted and boundaries discontinuous. In some areas specifically around the gypsiferous soils, the bioturbation is recent and ubiquitous, and this may be causing problems with interpreting the electrical resistance data. Also, it is proposed that the evaporative gypsiferous soils are the reason for the high resistance reading across the site. The high readings appear to follow the contours of the gypsiferous soils.

Area B

Area B investigations were limited to mapping the Area and collecting the surface artifacts. This large upland portion of the site consists of exposed bedrock and deflation pockets in the bedrock which have collected eolian and detrital sediments. Along the northern edge of Area B, sediments are thicker and bedrock is not visible; however, no subsurface testing was conducted by FLC in Area B. Evaluative testing by NMSU in Area B was conducted during 2000, and this report should contain more descriptive information on the sedimentary/depositional environments found here.

Area C

The test units in Area C were excavated in layers and levels to a depth at least 10cm and usually 20cm beyond the last level containing artifacts. Several different soil profiles were exposed due to the extent over which the test units were placed. These profiles and their stratigraphy are thoroughly discussed in Chapter 8. Generally, there are four primary sediment locales. Sediments in the south and middle portions of Area C possess structure, texture, etc., similar to the thick geomorphological profile adjacent to Big Water Arroyo, suggesting accumulation of alluvial deposits resulting in a Bt horizon. Further down in the test unit profiles, at undetermined depths, are probably the gypsiferous soils noted on the surface elsewhere. A second major sediment/soil area in Area C is the gypsiferous soils, which are in the lower south and east portions of the Area. This is a continuation of the gypsiferous soils found in Area A. Whether these soils are exhumed or not remains uncertain. The excavation unit next to the tributary drainage exhibits anaerobic soils consisting of silts with clay and represents the third primary soil/sediment locale. These soils exhibit oxidation and gleyed coloration. Lastly, in the northwest portion of Area C, are alluvial sediments similar to those found elsewhere but here they display increased compaction properties, a result of concentrated tracked vehicular maneuvers.

Artifacts in Area C are sparse whether they are on the surface or from subsurface excavations. Primarily artifacts occur in Layer 1 or the top of Layer 2. Smaller artifacts

were found in the waterscreen control samples of the lowest layers but these could have easily migrated downward through various forms of bioturbation (i.e., cryoturbation, argilliturbation, floraturbation). There were no features or ethnostratigraphic horizons recognized in the test units from Area C . Artifacts were not concentrated in vertical units, and no diagnostics artifacts other than the few ceramic sherds were recovered. There was so little charcoal encountered that we were unable to obtain a sufficient amount for a radiocarbon date.

Area D

Sediments at the proximal end of the terrace within Area D are largely composed of colluvial slopewash funneling from the sandstone outcrop above and from granular disintegration and slab failure of the sandstone. Sediments in the two test units placed in the small historic structure (Feature 1) displayed a recent A soil horizon that has formed since the abandonment of the structure. The structure was very shallow and confined mostly to the surface. We were unable to confidently identify a floor, but the sediments below the rock outline overlay a thick Bt soil horizon formed in alluvial deposits and are similar to those exposed in the geomophological profile across the drainage to the west.

All test units from Area D exhibited a surface cumulative A horizon that overlaid an older soil that formed in alluvial sediments. In some test units, the C_aC0^3 increases with depth, but in others there is a slight decrease followed by another increase. The increased calcium carbonate is accompanied by lighter coloration until the C_aC0^3 reaches a Stage I with calcium carbonate streaks and concentrations. Artifacts occur throughout the soil profile to about one meter in depth but never appear concentrated except within Test Unit 3 in the midden. Some of the smaller pressure flakes could possible have migrated downward in the soil profile through processes of bioturbation previously identified. However, there are a few larger flakes that are likely to be *in situ*. Larger artifacts still were found between 60 and 70 cm in shovel tests at the contact of the alluvial deposits with the Stage II carbonate horizon. Perhaps this contact represents a period of stability before overlying flood deposits. If so, then these lower artifacts could denote considerable antiquity if the Bk horizon was formed within the overlying Bt horizon and not an old soil that was exhumed. Sandstone rocks could possibly represent use surfaces as well. These were found around 50 to 60cm below the surface in two of the test units. A possible use surface was also identified in three test units that exposed a thermal feature of unknown function.

Geomorphological Cutbank Profile

Along the south bank of Big Water Arroyo opposite of Area A is a deep stratigraphic profile cut that was excavated by NMSU and was reexcavated by FLC (Figure 6.12). This profile cut is 1 meter wide and extends the length of the cut bank for 1.92 meters but does not extend to the level of the drainage bottom (Figure 10.2). The gemorphological profile was stepped back twice by the original excavators to prevent collapse and to facilitate stratigraphic work. The profile remained in excellent shape. The recent slump was removed

by shovels to expose the profile for evaluation and to collect sediment, pollen and magnetic susceptibility samples. Sediments in the profile are interpreted to be alluvial in origin with slight amounts of eolian and colluvial sediments in the surface cumulative A soil horizon. In the natural cutbank profile upstream from the geomorphological profile sediments are very sandy, which also represent alluvial sources although it cannot be ruled out that these later sediments are eolian. A grain size analysis, sorting and rounding might give insights into the two possibilities.

Overall, the profile is dominated by silt with pebble lenses. Some cross-bedding indicates an obvious alluvial transport source. Stratum I is a thick loam that overlies an old soil that has a Bt horizon that was truncated. The lower boundary is wavy and suggests an erosional surface. Stratum II is a very thick alluvial deposit that formed as a Btb horizon in silty to sandy loam, while Stratum III is composed of interbedded silt and sand lenses.

Three major lithostratigraphic units are identified in the profile's north face (Figure 10.2 and 10.3). Stratum I is the most recent. It consists of overbank sediments mixed with colluvium from slopewash deposits. It is similar to Strata II and III in test units from Area D. A weak A to O soil horizon has formed at the surface but generally Stratum I represents a cumulative A horizon overlying a buried Bt horizon. Calcium carbonate increases with depth in the stratum and the lower boundary represents an erosional unconformity. Stratum II is a Btb horizon formed in alluvium. It is very similar to Stratum III and IV in test units from Area D and to the Bt soil in test units from Area C. The carbonate grades from a Stage I at the top of the stratum to a Stage II at the bottom. The boundary is clear to abrupt with Stratum III. Stratum III is composed of interbedded silts and sand lenses. These represent facies changes in the alluvium from Big Water Arroyo. Alternating textures from silt to sand maybe somewhat discontinuous. At the bottom of the exposure the sediments are almost

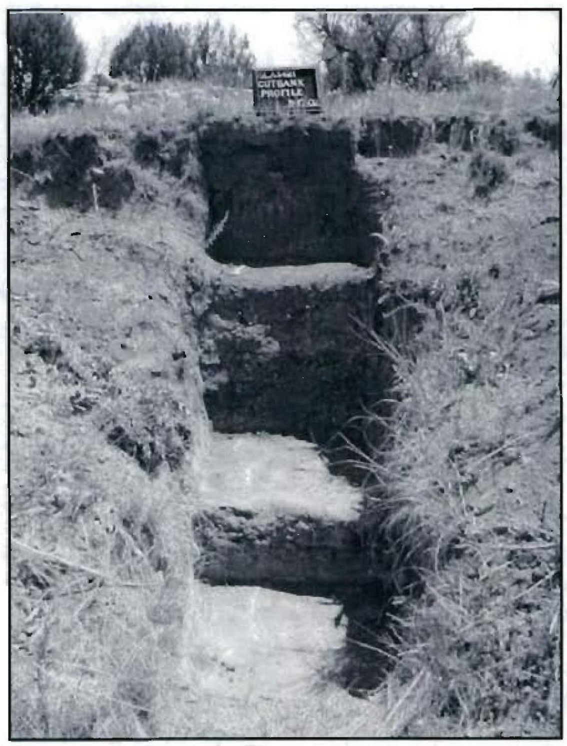
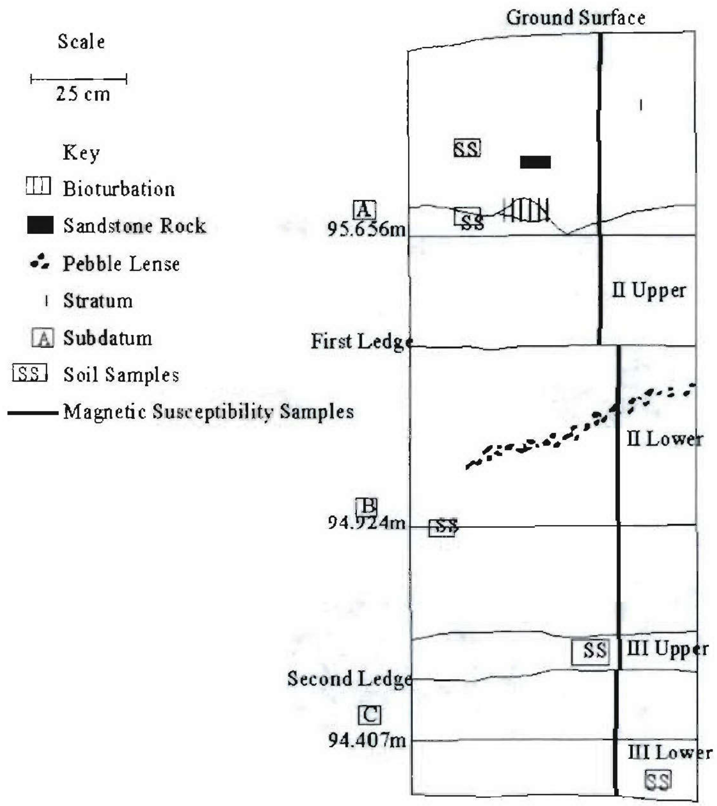


Figure 10.2. Photograph of cutbank profile, 5LA3421.



Stratum I - 7.5YR 5/2 to 4/2, brown to dark brown sandy loam, weak subangular blocky structure, clear to abrupt lower boundary, smooth and wavy probably represents erosional surface. Moderate to slight reaction to hydrochloric acid, gypsum present, 0-1% angular gravel. Slight A to O horizon with a cumulative A horizon overlying a Bt horizon.

Stratum II - 10 YR 6/2 light brown gray to 10YR 5/3 brown silty clay loam to sandy clay loam. Columnar soil structure breaking to coarse subangular blocky. Lower boundary is clear to abrupt and smooth to wavy. Slightly violent to violent reaction to hydrochloric acid. Clay, gypsum, calcium carbonate, cobble lense and bioturbation present. Well-sorted pebbles make up 0-1% of sediments. Stage I to II carbonates. Btb horizon.

Stratum III - 10YR 6/3 pale brown to 10YR 4/3 brown to dark brown clay loam to single grain sandy loam in the lowest portion. Lower boundary remains concealed. Slight violent to violent reaction to hydrochloric acid. Iron, calcium carbonate and gypsum present. Stage I or II carbonates. Facies changes from creek grading from silt to sand to silt.

Figure 10.3. Cutbank profile.

entirely a single grain medium to coarse sand. Carbonates are a Stage I in this stratum and gypsum and iron minerals are present.

Two pollen samples were collected from Stratum III, one from the boundary between Stratum II and Stratum III. and a second from the lower limits of Stratum III exposed in the profile (Figure 10.3). We anticipated that perhaps the pollen would indicate a change in the overall climatic regime since it was observed that a depositional change had occurred between the upper and lower portions of Stratum III. The pollen assemblage, however, from these two samples were quite similar. Both were dominated by durable types including low spine Asteraceae, *Artemisia*, Cheno-Am, *Juniperus* and *Pinus* pollen grains. The pollen concentration values are the lowest for any sample submitted (Appendix III). What this suggests is that differential preservation may have occurred in these deposits. Of interest is the occurrence of two *Zea mays* pollen grains from the upper portion of Stratum III. Jones (2003) attributes the presence of maize pollen in this sample as likely having been introduced through bioturbation. Bioturbation is ubiquitous across the site, but none was observed in this profile and the presence of the maize could be more related to deposition. Since no radiocarbon dates are available from the profile, we have no way of knowing when the lower stratum was deposited. It is possible, although certainly not conclusive that this profile may have accumulated rather rapidly since the time of the prehistoric occupation.

Magnetic susceptibility samples were collected every two vertical centimeters cm throughout the profile (Figure 10.3). Data plots of the mass susceptibility are presented in Tables 9 and 10 in Appendix I. The results of the mass susceptibility data indicate little development of the soil throughout the profile (Appendix I). The data further suggest that the deposit accumulated gradually over a period of time with limited soil formation. Slight peaks in magnitude for the magnetic susceptibility occur between 98 to 135 cm below the surface and between 148 and 158 cm below the surface. The first peak occurs in the lower part of Stratum II, while the second peak is in the very upper portion of Stratum III. These peaks suggest a period of more stable environmental conditions accompanied by soil formation activities (Appendix I).

Summary and Conclusions

Area A, the historic component, is about the highest point along the alluvial plain that contains most of the site area. The sediments here are very light brown to buff and almost grading to white. To the east toward the unnamed tributary, the soils contain high concentrations of gypsum. These gypsiferous soils are most probably the oldest soils exposed at the site and may be as old as the Pleistocene. Sediments in the geomorphological cutbank along Big Water Arroyo appear alluvial with some colluvial and perhaps some eolian in the upper cumulative "A" horizon. In a natural cutbank exposure of Big Water Arroyo west of the site, the sediments are very sandy and are believed alluvial in origin although no structures were observed in the sand. There is extensive bioturbation across the entire site, visible in the interrupted and discontinuous boundaries of the test unit profiles.

Area B was not tested by FLC in 2002, but considerable subsurface excavations were conducted by NMSU in 2000. The sediments are mostly eolian and alluvial with some colluvium from weathering of the sandstone bedrock. Deposits are usually shallow and confined to the areas of low relief within the bedrock exposure. To the north and east, the bedrock may dip because in places it is completely blanketed by sediments. The depth to bedrock remains speculative.

Area C, north of the historic component in Area A is a large but sparse prehistoric lithic scatter. Several stratigraphic profiles were exposed that suggested differences in depositional and pedogenic histories across this very large area. There were no features , ethnostratigraphic horizons, or paleosols recognized in the test unit excavations in Area C.

The small terrace on which Area D is located produced deep alluvial sediments with at least two soils represented–a surface soil, which overlies a truncated soil. Deeper in the profile magnetic susceptibility samples in Test Unit 3 demonstrated an increase in susceptibility values suggesting the possibility of another paleosol between 85 and 95 cm below the surface. A radiocarbon date obtained from terrestrial gastropods obtained from about 10 cm above this produced a date of 5750 B.C. From excavations in Area D, at least two ethnostratigraphic units were observed, one belonging to the Diversification Period, which is near the surface and the second buried at depths greater than 70 cm below the surface. There may be more cultural components present in this area, but our limited testing was not able to quantify their presence. Soil auger tests below the depth of excavations demonstrated the presence of sediments to a depth of at least 1.7 m below the surface. Small amounts of charcoal were collected from these auger tests but the samples were too small to date. We believe that the terrace has been in place for a significant period of time and may have been stable enough to support human occupation. If the lowest deposits on the terrace have not been eroded, then it is possible that the terrace was inhabitable as far back as the Late Paleo Indian or Early Archaic periods.

CHAPTER 11
CONCLUSIONS

From July through August of 2002 a crew from Fort Lewis College conducted evaluative testing on an archaeological site in the PCMS. The crew consisted of staff and students from the Department of Anthropology. The work was completed under a cooperative agreement with the National Park Service, Midwest Archeological Center (MWAC) in Lincoln, Nebraska. Work undertaken at this large multicomponent site consisted of surface artifact and feature inventory and recordation, surface artifact collection, total station mapping, geophysical surveys and limited subsurface testing. The purpose of the investigation was to better define the site boundary and determine if the site was potentially eligible for nomination to the National Register of Historic Places (NRHP). If recommend as having the potential for nomination to the NRHP then determine the feasibility to protect the site *in situ*. If it was determined that the site could not be protected *in situ* then efforts would be expended to determine which areas should receive data recovery and what methods would best achieve this goal.

The site, 5LA3421, lies within the steppe and alluvial plains of the PCMS. It is located along Big Water Arroyo, a tributary of Taylor Arroyo. At the time of the original recording in 1984, the site boundaries consisted of the area along the exposed sandstone bedrock and the small alluvial terrace immediately below and to the south of the sandstone rim to its junction with Big Water Arroyo. Sometime later, a historic site, 5LA3121 was subsumed into the one site, 5LA3421, and the boundary was extended much further to the west and northwest from the original site boundary. The total of the fenced area for the site is approximately 20 acres. This includes only the area within the current protective fencing. However, it is noted that the original boundary of 5LA3421 as recorded by DU in 1984 extends along the bedrock to the east and beyond the protective fencing. For the purposes of this study, investigations were confined to the area within the protective fence unless otherwise noted. Because the site is so large and complicated, it was divided into four areas, Areas A through D. Area A consists of the historic homestead, Area B the portion along the sandstone outcrop, Area C the alluvial plain north of the historic homestead and Area D the small terrace below the sandstone rim.

Surface mapping and collection of diagnostic artifacts were completed in areas A, C and D. A total surface collection was undertaken in Area B. Surface geophysical surveys were conducted in Areas A and D while subsurface investigations were carried out in Areas A, C and D. The results of the gradiometer and resistance surveys demonstrated the presence of pathways and artifact scatters not visible from the surface. These pathways lead to and from the historic well to an area interpreted to be a corral with an associated shed that is now visible only as a stone foundation. Gradiometer results showed artifact scatters in and around the homestead with one concentration in the area of the corral. Two locations in Area A were chosen for subsurface testing based on the geophysical results. The magnetic survey

of a portion of Area D with a small historic foundation did not produce any buried anomalies. The few magnetic anomalies detected in Area D were identified as pieces of wire that were slightly buried or that were wrapped around boulders. Subsurface testing included shovel tests, auger tests and grid excavations.

In Area A, auger tests were conducted to determine the depth of sediments and to identify subsurface strata that might effect the geophysical surveys. Test unit excavations in Area A at the historic homestead included three 2 m x 2 m units in and adjacent to the domicile, two 1 m x 1 m test units in the dugout, a 2 m x 2 m test unit in a magnetic anomaly, and a 2 m x 2 m unit in an area with a resistance anomaly. Two prehistoric hearths were exposed on the surface in Area A, and these were fully excavated. In Area C, 25 1 m x 1 m test units were excavated across a very large area consisting of a disperse scatter of prehistoric artifacts. Due to the size of Area C and the lack of concentrations of artifacts, a table of random numbers was consulted to determine a statistical sample of units to be excavated. Nine 1 m x 1 m test units were excavated in Area D along with 17 shovel tests. No subsurface testing occurred in Area B.

Area A

Results of surface and subsurface investigations of Area A indicate the presence of two cultural components. The earliest component is prehistoric, represented on the surface by a scatter of flaked-lithic artifacts, two metate fragments, and two hearth features. A radiocarbon date on charcoal, recovered from Hearth 1, produced a calibrated date that ranges between A.D. 1280 and A.D. 1450. This range falls within the Diversification period of the Late Prehistoric stage, and more specifically, within the Apishapa phase (Zier and Kalasz 1999). Although flaked-lithic artifacts were recovered from the subsurface investigations, a buried ethnostratigraphic horizon was not identified. The lack of diagnostic cultural remains and the absence of a buried cultural horizon indicates that the prehistoric component identified in Area A is marginal.

A later, historic component is comprised of five historic features and a rich surface scatter of historic artifacts. Historical documentation indicates that these structures are attributed to the Harry Leplatt homestead, patented in 1921, with an adjoining land patent issued in 1926. Based on the average of five years to "prove up" a homestead claim, Harry Leplatt probably occupied this site as early as 1916. The nature of the land patent transfers suggests that Harry Leplatt was originally involved with dry farming, but ultimately turned to raising livestock. The archeological record generally supports the model of livestock raising at the site.

The historic research, combined with the subsurface testing conducted at the historic homestead, provide sufficient data to warrant a recommendation of eligibility for the NRHP. The origins of the Harry Leplatt homestead are during the historical context of the Later American Period (1891-1984). It was during this period that the PCMS experienced the most intense era of settlement in its history (Carillo 1988a 1988c; Friedman 1985: 122).

Unlike other portions of the Great Plains, southeast Colorado did not have many European immigrants (Friedman 1985: 196). The combination of historical and archeological data for this homestead can therefore address the areas of significance related to ethnic heritage and settlement, particularly ethnic settlement in the rural west (Carrillo 1988c).

Area B

Investigations in Area B were limited to mapping and surface collection of all visible artifacts. Previous investigations by NMSU included subsurface testing, but these data were not available at the time of this report, and it is not known what was discovered subsurface in Area B. It is beyond the scope of this report then, to further evaluate its significance or to provide management recommendations about Area B.

Area C

Twenty-five test units were randomly selected for excavation in Area C. The units were excavated to various depth; however, artifacts were limited to Layer 1 and the upper part of Layer 2. Smaller artifacts were found in the waterscreen control samples at deeper depthsbut these could have migrated downward through various forms of bioturbation (i.e., cryoturbation, argilliturbation, floraturbation). There were no features or ethnostratigraphic horizonsidentified in the test units from Area C. Artifacts were not concentrated in vertical units and no diagnostics artifacts, other than the few prehistoric ceramics, were recovered. Subsurface excavations in Area C have demonstrated that there is little potential for this prehistoric component to contribute to the prehistoric knowledge of the PCMS.

Area D

Area D proved to be very interesting. Surface features included a historic stone foundation that was probably associated with a low sandstone wall that followed along the sandstone rim and a possible livestock pen toward the southeast end of the Area. Testing of the historic component here demonstrates that this component has little potential to yield significant archeological information on the historic period of the PCMS and little information could be gained from additional investigations.

An area of dark sediments with artifacts, charcoal, bone, and shell suggest the possibilityof a prehistoric midden. The midden would most likelyhave been associated with a low sandstone rockshelter just to the north and perhaps the remains of a small sandstone structure identified during testing. A concentration of artifacts in the midden areacontained diagnostic projectile points, which are assigned to the Late Archaic to Late Prehistoric Periods. Testing of the prehistoric component identified two possible ethnostratigraphic units–one near the surface and another at a depth around 70 cm bgs. The presence of corn agriculture is implied through the identification of *Zea mays* pollen. Charcoal collected from Test Unit 2, 3, 4, 7, 8, and 9 produced conventional radiocarbon dates of 990±40 BP, 2660 ± 110 BP, 3690±40 BP, and 6900±40 BP. The first date corresponds nicely with the small projectile points and with the presence of maize. This component then is placed within the latter part of the Developmental Phase. The earlier dates, along with stratigraphic and

artifactual evidence suggests the potential for two additional buried cultural components in this area.

The depth of cultural deposits in Area D extends to at least 70 cm in portions of the site and could possibly date to the Middle Archaic, although no diagnostic artifacts were recovered from the stratum that dates to this period. The possibility of a buried prehistoric component is recognized. The basis for this statement lies in the recovery of flaking debris from the stratum that dates to 5,800 B.P. as well as the presence of a paleosol in the same general stratigraphic layer. The paleosol was recognized from the magnetic susceptibility samples as an increase in the amount of remnant magnetism generally associated with A soil horizons.

National Register of Historic Places Evaluation

The historic structures of the Leplatt homestead despite lacking architectural significance, do possess archeological significance. Two of the five historic feature were tested, illustrating the presence and integrity of intact cultural deposits. Numerous diagnostic artifacts were recovered from subsurface contexts, and it is highly probably that more remain.

Evaluative testing in Area D identified that this portion of the site possesses a long prehistoric record perhaps dating to the Middle Archaic Period and into the Late Prehistoric Period. The abundance of artifacts, the exposure of two buried features, the presence of charcoal for radiometeric dating and a buried paleosol were identified from the small amount of testing conducted in this area.

Results of the evaluative testing at site 5LA3421 have demonstrated the potential of the site to contribute knowledge about the prehistory and history of the PCMS as defined in the research designs and cultural contexts from southeastern Colorado and the PCMS in particular (Andrefsky 1988; Carrillo 1988a, b, c; Eighmy 1984; Friedman 1985; Zier and Kalasz 1999). The site is therefore recommended as having the potential to be nominated to the National Register of Historic Places.

Management Recommendations

It is recommended that Area A that encompasses the homestead be fenced for protection against tracked-vehicular traffic. The homestead has already received quite a bit of damage from these maneuvers. It is suggested that a more imposing fence (one that can not so easily be driven through) be constructed around the perimeter of the site.

Area B was mapped and surface collected by FLC but was not tested. Testing had been previously conducted in this portion of the site by NMSU. Their information should be used to more thoroughly manage this portion of the site.

Archeological investigations in Area C failed to identify any subsurface cultural horizon. Artifacts were sparse across the surface and even more sparse in the subsurface.

It is therefore recommended that Area C has little potential to yield significant information on the prehistory of the PCMS. No further archaeological work is recommended.

It is recommended that Area D be fenced from the gap in the middle of the sandstone ledge south toward Big Water Arroyo. Fencing should continue to the east to where Area D ends near the point where the bedrock is exposed next to Big Water Arroyo. Some of the features in Area D are shallowly buried and in danger of being compromised through continued military maneuvers.

CHAPTER 12
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APPENDIX I

MAGNETIC SUSCEPTIBILITY INVESTIGATIONS

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Survey area: Site 3421, Pinon Canyon Maneuver Site, Las Animas County, Colorado (Figure 1).

Surface features: Cultural materials are located in rockshelters on the lowest terrace of Big Water Arroyo, on sandstone rim above the shelters, and extend out onto the flats. Prehistoric features consist of spaced stone circles on the flats, a stone enclosure abutting the sandstone outcropping above the arroyo, and four rockshelters. In addition to the structural features associated with the prehistoric component, bedrock metates are present on the surface of the bedrock outcroppings across the site. The historic component consists of stone foundations and alignments, as well as, wooden posts identifying the location of a well.

Subsurface features: The rockshelters contain thick middens with a diversity of prehistoric artifacts. The historic features contain a diversity of early 20th century artifacts. Excavations were conducted at the site in by personnel from New Mexico State University in 2000 (Dr. David Kuehn, personal communications 2000,2003) and Fort Lewis College in 2002 (Mona Thompson-Charles, personal communications 2002,2003).

Survey grid: archeological/geophysical grid aligned on magnetic north.

Instrument: Bartington MS2 magnetic susceptibility meter with MS2B dual frequency sensor

Specifications: operating frequency for Low Frequency (LF) at 0.465 kHz and for High Frequency (HF) at 4.65 kHz; maximum resolution: 2 X 10^{-7} CGS (HF and LF); accuracy: 1%; HF/LF cross calibration 0.1% worst case; temperature induced drift: not greater the ± 0.5 X 10^{-6} CGS/minute for ambient temperature fluctuation of $\pm$ 1°C/hr.

Survey type: magnetic susceptibility

Operator: Kelsey M. Lowe

Introduction

Magnetic susceptibility measures the degree to which a material may be magnetized (Sheriff 1973:135). It is defined as the ratio of the induced magnetic field in a material to the applied magnetic field. It can be expressed as volume susceptibility (K) where the measurement is normalized by volume or as mass susceptibility (X) where the measurement is normalized by mass. Volume susceptibility (K) is equal to the volume magnetization induced in a material of susceptibility (M) divided by an applied field (H). Volume susceptibility is a dimensionless quality (Thompson and Oldfield 1986:25). The low field mass susceptibility (X) is equal to the volume susceptibility (K) divided by the bulk density of the sample (ρ in units of kg cm^{-3}). This yields X values in the International System's (SI) units of m^3 kg^{-1}.

Magnetic susceptibility may be one of the most important but least utilized geophysical investigative techniques in archeological landscape studies. In general, the technique is extremely sensitive to environmental change and is widely used in environmental studies (Thompson and Oldfield 1986). The techniques for the measurement and interpretation of magnetic susceptibility are derived from the fields of rock magnetism and paleomagnetism (Banerjee 1981; Dearing 1994; Nagata 1961; Tarling 1983).

Iron oxides are present in most of the earth's soils. The iron is present and magnetically detectable in grains of magnetite, maghaemite, and hematite. The process of weakly magnetic oxides and hydroxides that are converted to more strongly magnetic forms within the subsurface layers is referred to as "magnetic enhancement." These iron minerals in the soil are "susceptible" to becoming magnetized in the presence of a magnetic field (Ellwood et al. 1998). Enhancement occurs as a function of soil formation and is commonly seen to have higher susceptibility values within the surface layers. The magnetic grains that are produced are typically fine-grained and thus an increase in frequency dependence in conjunction with an increase in susceptibility is potentially indicative of a developed soil (Dalan et al. 2003). This fundamental property can be quickly and easily measured on small samples.

The application of magnetic susceptibility to archeological prospection centers around two factors: 1) typically, greater susceptibility is found in the topsoil than in underlying subsoil, and 2) human activities associated with site occupation enhance the susceptibility of the topsoil (Clark 1996). The method has been developed to detect evidence of human occupation and define site limits in the topsoil even when no distinctive features have survived. It can be applied to research questions concerning the following topics: 1) site limits, activity areas, or features; 2) morphology or function of sites, activity areas, and features and their formation processes; 3) the effects of sedimentation and erosion upon the archeological record; 4) establishing and expanding stratigraphic sequences; and 5) climatic regimes and other information on soil-forming factors (Dalan and Banerjee 1998:13). Dalan and Banerjee (1998) provide an overview of the historic and present applications of the techniques to archeological investigations.

While many of the past applications have centered on the areal prospection of the surface, the present project is concerned with the magnetostratigraphy (Clark 1996). This type of project is the magnetic study of the accumulated deposits, which may provide information about the intensity of the occupational level (Yates 1989). The techniques can also be used to correlate stratigraphy across a site, as well as, identify buried soils or paleosols (Dalan and Banerjee 1999).

Methods

The Bartington MS2 magnetic susceptibility meter (Bartington 1989) was used with a MS2B dual frequency laboratory sensor to collect both low and high frequency

readings of the sample (Figure 2). The ability of the laboratory sensor to operate at two different frequencies also provided for the study of the frequency dependency of susceptibility of the samples. Soil samples were collected during the 2002 Fort Lewis College archeological investigations at Site 5LA3421 (Figure 3). During the excavations, soil samples were collected from the 2000 New Mexico State University stratigraphic trench along the cut bank on the right site of the arroyo (Figures 4 and 5) and from the east wall of Test Unit 3, Area D, in the midden of a rockshelter above the left bank of Big Water Arroyo (Figures 6 and 7). Soil samples from each magnetic susceptibility column were collected at two-centimeter increments. The samples were placed in plastic zip-lock bags and labeled with the site provenience and depth information. The magnetic susceptibility column from the east wall near the northeast corner of Test Unit 3 (Figure 8). The magnetic susceptibility sample column from the test unit extended from the surface to a depth of 1.02 m below the surface (bs). In the stratigraphic trench, the samples were taken from the south wall of the cutbank profile at 906.86N/866.90E. The sample column from the trench extended from the surface to a depth of 1.87 m bs.

The soil from each magnetic susceptibility sample was packed into an Althor P15 (nonmagnetic) plastic box (5.28cc volume). The samples were labeled with the provenience information. Initially, the meter was set to zero before a sample was inserted into the MS2B sensor. The sample was measured and the result recorded. The sample was removed from the sensor, the meter was again zeroed. The sample was measured a second time and the result recorded. The two measurements were then averaged together. These steps were repeated for each sample in the Low Frequency 470 Hz range and then in the High Frequency 4700 Hz range. Both the volume susceptibility values (K) and the low-field mass susceptibility values (X) were then calculated from the Bartington unit readings. Magnetic low-field susceptibility is equal to the sample Bartington reading minus the empty box reading divided by a conversion constant established for the PI5 plastic box (k): 1) for the SI volume susceptibility units [K (dimensionless SI)], $k = 1.015\times10^{-4}$/(sample volume in cm^3) and 2) for the SI mass susceptibility units [X ($m^3\ kg^{-1}$)], $k = 1.015\times10^{-7}$/(sample mass in g).

Using the sample from the 0 to 2 cm level below the surface from the cutbank profile from stratigraphic trench, we have 7.0 g of sandy loam soil packed into a PI5 box with a volume of 5.28 cm^3. With the Bartington meter set to the 0.1 SI scale, an empty PI5 box measures –0.5 Bartington units (plastic is diamagnetic). The box with the sample in it measures 36.5 Bartington units at the low frequency setting and 36.0 Bartington units at the high frequency setting. These numbers yield the following susceptibilities:

volume susceptibility: $K = (36.5-(-0.5))(1.015\times10^{-4})/5.28\ cm^3 = 7.11\times10^{-4}$ SI

mass susceptibility: $X_{LF} = (36.5-(-0.5))(1.015\times10^{-7})/7.0\ g = 5.34\times10^{-7}\ m^3\ kg^{-1}$
$X_{HF} = (36.0-(-0.5))(1.015\times10^{-7})/7.0\ g = 5.12\times10^{-7}\ m^3\ kg^{-1}$.

Frequency dependency ($X_{fd\%}$) is equal to the low frequency reading minus the high frequency reading divided by the low frequency reading. In order to get the percent, the resulting value is multiplied by 100. For the example listed above, $X_{fd\%}$ = (36.5-36.0)/36.5) x 100% = 1.37%.

The system setup and use of the Bartington MS2 magnetic susceptibility meter and the MS2B sensor along with the formulas for the calculation of the volume susceptibility, mass specific susceptibility, and frequency dependent susceptibility are defined in Dearing (1994:11-18). The results of the K values at both frequencies, X values for the X_{LF} and the X_{HF}, and the $X_{fd\%}$ for the cutbank profile samples in the stratigraphic trench are listed in Table 1. Table 2 contains the K values at both frequencies, X values of X_{LF} and X_{HF} values along with the $X_{fd\%}$ values for Test Unit 3. The resulting data from the susceptibility measurements were placed in Golden Software's GRAPHER software (Keckler et al. 1994) for plotting.

Results of the Magnetic Susceptibility

The magnetic susceptibility of soils has a high correlation with the mineralogy of the parent material and local geology (Dearing 1994:48). Soils developed in strongly magnetic basalts have higher X values than soils developed in limestone or sandstone. Soils generally have higher X values in the topsoils as compared with the subsoils. Magnetic enhancement of the topsoil results from accumulation of primary minerals that are resistant to weathering found in the parent material (Dearing 1994:48-51) and the formation of secondary minerals by burning of soil in the presence of organic matter (Dearing 1994:51), by the addition of dust from industrial combustion processes or volcanic eruptions (Dearing 1994:51), and/or by organic and inorganic chemical processes in the soil (Dearing 1994:51-52). The degree of the magnetic enhancement in the topsoil is controlled by the local geology, the climatic conditions, vegetation and organic matter, soil organisms (i.e., bacteria), and time (Dearing 1994:55-61). Human activity also has an effect on the susceptibility through heating effects from fires and chemical and bacterial effects on garbage decomposition (Dearing 1994:88-91). Magnetic enhancement also allows the identification of buried soils, characterization of sediments, and identification of source locations.

Cutbank Profile, Stratigraphic Trench

Data plots of the mass susceptibility and volume susceptibility from the cutbank profile of the stratigraphic trench are presented in Figures 9 and 10, respectively. The mass susceptibility data for the cut bank profile shows minimal development of the soil layers throughout most of the profile. The X_{LH} values range between 1.44E-07 and 12.48E-07 m^3 kg^{-1} with a mean of 6.44E-07 m^3 kg^{-1} and a standard deviation of 1.24E-07 m^3 kg^{-1}. The X_{HF} values range between 1.45E-07 and 12.51E-07 m^3 kg^{-1} with a mean of 6.38E-07 m^3 kg^{-1} and a standard deviation of 1.23E-07 m^3 kg^{-1}. X_{LF} values ranging from 5.35E-07 m^3 kg^{-1} at the surface to 7.89E-07 m^3 kg^{-1} at approximately 57 cm bs and X_{HF} values ranging between 5.27E-07 m^3 kg^{-1} and 7.79E-07 m^3 kg^{-1}. This suggests that the deposit accumulated gradually over a period

of time with limited soil formation since one generally sees an increase in the magnetic susceptibility in the upper soil horizon during stable periods of soil development. There are slight peaks in magnitude for the magnetic susceptibility between 98 to 135 cm bs and 148 to 158 cm bs. These peaks do suggest period of more stable environmental conditions where soil formation activities have resulted in increases in the magnetic susceptibility. A different material is apparent towards the bottom of the profile at a depth of 1.80 m with a X_{LF} value of 12.5E-07 m^3 kg^{-1}, suggesting a different composition reflected by higher magnetic material that's coarser in grain size, a different carrier, or a much different environmental setting affecting the soil formation in the lower portion of Stratum III. The low frequency • •values range between 2.27E-04 and 19.15E-04 SI with a mean of 9.28E-04 SI and a standard deviation of 1.89E-04 SI. The high frequency • •values range between 2.28E-04 and 19.19E-04 SI with a mean of 9.19E-04 SI and a standard deviation of 1.88E-04 SI.

Test Unit 3, East Wall

Data plots of the mass susceptibility and volume susceptibility from the East Wall profile of Test Unit 3 in Area D are presented in Figures 11 and 12, respectively. The X_{LH} values range between 11.79E-07 and 23.97E-07 m^3 kg^{-1} with a mean of 14.55E-07 m^3 kg^{-1} and a standard deviation of 2.47E-07 m^3 kg^{-1}. The X_{HF} values range between 11.45E-07 and 23.37E-07 m^3 kg^{-1} with a mean of 14.30E-07 m^3 kg^{-1} and a standard deviation of 2.35E-07 m^3 kg^{-1}. The mass susceptibility data for Test Unit 3 shows well developed and highly magnetic soils in the upper strata (Stratum I, II, and III), with X_{LH} values ranging from 11.8E-07 m^3 kg^{-1} at the surface to a high of 24.0E-07 m^3 kg^{-1} at approximately 9 cm bs with additional peaks of 20.2E-07 m^3 kg^{-1} at 25 cm bs and 19.0E-07 m^3 kg^{-1} at 30 cm bs and X_{HF} values ranging from 11.4E-07 m^3 kg^{-1} at the surface to a high of 23.4E-07 m^3 kg^{-1} at approximately 9 cm bs with additional peaks of 19.7E-07 m^3 kg^{-1} at 25 cm bs and 1.86E-07 m^3 kg^{-1} at 30 cm bs. The peak measurements of magnetic susceptibility in the upper strata probably reflect the increases in the formation of organic iron compounds from microbial activity (Alexander1997:373-375). The upper strata consist of organically enriched midden deposits from the human occupation of the rockshelter. The organically bound iron in the organic materials forming the midden deposit is released by many different heterotrophic species. The susceptibility measurements remain relatively high until approximately 47 cm bs where they begin to decrease to an average of approximately 12.5E-07 m^3 kg^{-1} throughout the lower portion of the profile in Stratum IV, V, and VI. There is a slight increase in magnitude between 85 to 95 cm bs to over 13.0E-07 m^3 kg^{-1}. The low frequency • •values range between 13.62E-04 and 34.51E-04 SI with a mean of 19.71E-04 SI and a standard deviation of 3.91E-04 SI. The high frequency • • values range between 13.23E-04 and 33.63E-04 SI with a mean of 19.37E-04 SI and a standard deviation of 3.73E-04 SI.

Results of the Frequency Dependence Susceptibility

Frequency dependence susceptibility measurements are useful in detecting the presence of ultrafine (<0.03μm) superparamagnetic ferrimagnetic minerals resulting from bacterial or chemical processes in the soil (Dearing 1994:17-18). The contribution of these magnetic grains show the most pronounced frequency dependence of susceptibility due to their delayed response to the magnetizing field (Dalan et al. 2003), whereas, magnetic susceptibility itself is sensitive to larger grain-sized materials such as multidomain or pseudo-single grain domain sizes. The concentration of superparamagnetic grains provides information on the origins of magnetite and domain size in primary and secondary minerals associated with environmental magnetism studies. Primary minerals (e.g., ferrimagnetic iron oxides and sulphides such as magnetite, maghemite, titanomagnetite, titanomaghemite, etc.) are minerals formed in igneous rocks and contain an extremely high percentage of their original magnetic properties. Secondary minerals (e.g., other ferrimagnetic iron oxides and sulphides) represent minerals formed by processes associated with burning, fossil fuel combustion, diagenesis, authigenesis, soil formation, and bacteria (Dearing 1994:42). Domain state and crystal size give clues to the formation processes of magnetite. These tend to fall into three categories. The multidomain size category contains primary rock minerals and products of fossil fuel combustion. Stable single domain size ranges contain primary rock minerals and secondary minerals formed by fossil fuel combustion, burning, pedogenesis, and bacteria. Burning, pedogenesis, and bacteria produce superparamagnetic behavior in the mineral domain (Dearing 1994:42).

Samples with superparamagnetic ferrimagnetic minerals typically show as slightly lower values when measured in the high frequency range compared to their low frequency measurements. With low $X_{fd\%}$ values of less than 2% virtually no superparamagnetic grains (< 10%) are present in the sample (Dearing 1994:43). $X_{fd\%}$ values of 2% to 10% indicate that samples consists of an admixture of less than approximately 10% superparamagnetic grains with other coarser stable single domain size and multidomain size ferrimagnetic iron oxides and sulphides. A $X_{fd\%}$ value of 8% is equivalent to a superparamagnetic grain concentration of 50%. Samples with $X_{fd\%}$ values of 10% contain virtually all superparamagnetic domain sized grains, greater than 75%. Very high $X_{fd\%}$ values greater than 12% to 14% are extremely rare, and may indicate an erroneous measurement, metal contamination, anisotrophy, or a weak sample (Dearing 1994:43). This simple mixing model provides an estimate of the contribution of the sample's magnetite by superparamagnetic grains. To have a better approximation of the affect of grain size, additional analysis with Anhysteretic Remanent Magnetization (ARM) should be conducted.

Cutbank Profile, Stratigraphic Trench

The $X_{fd\%}$ data values are quite low (Figure 13). The $X_{fd\%}$ values range between -2.43 and 2.48% with a mean of 0.83% and a standard deviation of 0.81%.

The upper portion contains a slightly finer grain material, which is common in developing soils, and fine grains begin to decrease with depth. There is another peak in frequency dependence at approximately 96 cm bs, indicating about a 2% increase in the $X_{fd\%}$. A final peak occurs at approximately 1.48 m bs indicating a 2% increase in fine grains. Both of these increases in frequency dependency and corresponding increases in mass susceptibility occurs simultaneously with one another, which may suggest a developed or buried soil (paleosol).

Test Unit 3, East Wall

The $X_{fd\%}$ data from Test Unit 3 is also quite low (Figure 13). The $X_{fd\%}$ values range between 0.04 and 2.91% with a mean of 1.63% and a standard deviation of 0.78%. The fine grains are consistent throughout the upper portion of the profile and drop off at approximately 50 cm bs. A slight increase in fine grains of approximately 1% to 1.5% is noted at 75 cm bd. This increase in conjunction with a slight increase in the magnetic susceptibility at 85 cm bs suggest a potential developed or buried soil.

Conclusions

During the summer of 2000 and 2002, archeologists and students from New Mexico State University and Fort Lewis College conducted excavations at Site 5LA3421. The excavations were conducted as part of the Army's evaluation program of tracked vehicle damage to the site and the National Register of Historic Places eligibility reassessment of the site's significance to the cultural history of the Pinon Canyon Maneuver Site in Las Animas County, Colorado. Magnetic susceptibility samples were collected by the 2002 Fort Lewis College archeological crew from two locations: the 2000 cutbank profile in New Mexico State University's stratigraphic trench and the 2002 excavation of Test Unit 3 by Fort Lewis College. Low frequency and high frequency responses were measured with a Bartington MS2 magnetic susceptibility system. Both mass susceptibility and volume susceptibility values were calculated for the low and high frequency Bartington readings. The frequency dependency was also computed.

The analysis of the magnetic susceptibility exhibit two rather interesting profiles. The magnetic susceptibility analyses of the two profiles show the soil differences between the cutbank profile and in Test Unit 3. Slight increases in frequency dependence and mass magnetic susceptibility in both profiles suggested the potential for buried or developed soil layers; however, it should be noted that a 1 to 1.5% change may reflect the noise limits of the instrument. One needs to look at increases over three or more readings. Grain sizes for frequency dependence were low, averaging about 2.5% in fine grain material.

Increases in X values through magnetic enhancement provide information on the accumulation of ferrimagnetic minerals in the soil through numerous mechanisms as indicated above. In analyzing the magnetic susceptibility data from the Barnes Folsom Site, one needs to consider all of these factors. The data resulting from the

frequency dependent susceptibility provides a view of the types of magnetic material, which is found in the soils from the two excavations. The results indicate the types of ferrimagnetic minerals and give a clue as to their formation: primary minerals versus secondary minerals. The measurements at the two frequencies (X_{LF} and X_{HF}) are used to detect the presence of ultrafine (<0.03 μm) superparamagnetic ferrimagnetic minerals. The results are recorded as a percentage of the original LF value. These minerals occur as crystals, which resulted from bacteria or chemical processes in the soil (Dearing 1994:17). Values over 2% suggest a combination of the three types of domain sizes, which suggest multiple causes for the magnetic enhancement found in the excavation units. Values under 2% suggest that the magnetic enhancement relates to the presence of primary minerals, which is controlled by weathering, erosional, and depositional processes at the site. When combined with unit stratigraphic profiles, artifact analysis, geoarcheological analysis, the magnetic susceptibility data provide complementary data that can elucidate our understanding of the environmental history and site formation processes at the site, as well as, human activities.

Soil magnetic techniques have the potential to answer questions related to soil deposition and site formation processes. Contrasts in magnetic composition, concentration, and grain size may be capable of distinguishing features from the surrounding soil matrix or stratigraphic layers from each other (Dalan and Banerjee 1998:27-29). The magnetic techniques are highly sensitive, rapid, and economical, as well as. relatively nondestructive. Although this study only utilized the Bartington magnetic susceptibility meter for mass susceptibility and frequency dependence, it would be beneficial to conduct Anhysteretic Remanent Magnetization (ARM) analysis of the samples from the two units, since ARM is more sensitive to the presence of finer magnetic grains. By combining ARM and • •data, the characterization of the relative grain sizes and concentrations of magnetic minerals can be rapidly compared (Dalan and Banerjee 1998:20-24).

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Tables

Table 1. Magnetic susceptibility samples from the cutbank profile in the stratigraphic trench.

5LA3421 Cutbank Profile	Depth (cm)	Depth (cm)	bs Mass (g)	Low # 1 Frequency (SI 0.1)	Low # 2 Frequency (SI 0.1)	Average Low Frequency	High # 1 Frequency (SI 0.1)	High # 2 Frequency (SI 0.1)	Average High Frequency	Mass Susceptibility (m^3/kg) LF	Mass Susceptibility (m^3/kg) HF	Volume Susceptibility (SI) LF	Volume Susceptibility (SI) HF	Frequency Dependence (%)
Stratum 1	0-2	1	7	36.5	36.3	36.4	36	35.7	35.85	5.35E-07	5.27E-07	7.09E-04	6.99E-04	1.51
	2-4	3	6.9	41.1	41.1	41.1	40.6	40.4	40.5	6.12E-07	6.03E-07	8.00E-04	7.88E-04	1.46
	4-6	5	7.1	43.3	43.5	43.4	42.6	42.3	42.45	6.28E-07	6.14E-07	8.44E-04	8.26E-04	2.19
	6-8	7	7.1	44.1	44	44.05	43.3	43.5	43.4	6.37E-07	6.28E-07	8.56E-04	8.44E-04	1.48
	8-10	9	7.2	46.4	46.5	46.45	45.5	45.5	45.5	6.62E-07	6.48E-07	9.03E-04	8.84E-04	2.05
	10-12	11	7.3	47.2	47.1	47.15	46.3	46.1	46.2	6.63E-07	6.49E-07	9.16E-04	8.98E-04	2.01
	12-14	13	7.2	46.1	45.4	45.75	45.2	45.1	45.15	6.52E-07	6.44E-07	8.89E-04	8.78E-04	1.31
	14-16	15	7.6	48.2	48	48.1	47.5	47.2	47.35	6.49E-07	6.39E-07	9.34E-04	9.20E-04	1.56
	16-18	17	7.5	47.4	47.3	47.35	46.5	46.3	46.4	6.48E-07	6.35E-07	9.20E-04	9.02E-04	2.01
	18-20	19	7.6	49.5	48.7	49.1	48.6	48.7	48.65	6.62E-07	6.56E-07	9.53E-04	9.45E-04	0.92
	20-22	21	7.8	50.8	51.1	50.95	49.8	49.7	49.75	6.70E-07	6.54E-07	9.89E-04	9.66E-04	2.36
	22-24	23	7.3	45.9	45.8	45.85	45.8	45.1	45.45	6.44E-07	6.39E-07	8.91E-04	8.83E-04	0.87
	24-26	25	7.4	46.2	46.6	46.4	45.4	45.1	45.25	6.43E-07	6.28E-07	9.02E-04	8.79E-04	2.48
	26-28	27	7.5	48.1	48.3	48.2	47.3	47.2	47.25	6.59E-07	6.46E-07	9.36E-04	9.18E-04	1.97
	28-30	29	7.6	49.3	49.3	49.3	48.6	48.2	48.4	6.65E-07	6.53E-07	9.57E-04	9.40E-04	1.83
	30-32	31	7.7	51.7	51.7	51.7	50.4	50.8	50.6	6.88E-07	6.74E-07	1.00E-03	9.82E-04	2.13
	32-34	33	7.6	50.6	50.6	50.6	49.7	49.6	49.65	6.82E-07	6.70E-07	9.82E-04	9.64E-04	1.88
	34-36	35	7.8	50.4	50.2	50.3	49.5	49.5	49.5	6.61E-07	6.51E-07	9.77E-04	9.61E-04	1.59
	36-38	37	7.6	48.1	47.9	48	47.6	47	47.3	6.48E-07	6.38E-07	9.32E-04	9.19E-04	1.46
	38-40	39	7.6	49.8	49.7	49.75	49	48.9	48.95	6.71E-07	6.60E-07	9.66E-04	9.51E-04	1.61
	40-42	41	7.9	50.8	50.7	50.75	50.1	49.8	49.95	6.58E-07	6.48E-07	9.85E-04	9.70E-04	1.58
	42-44	43	7.7	52.2	52.2	52.2	51.1	51.2	51.15	6.95E-07	6.81E-07	1.01E-03	9.93E-04	2.01
Stratum 2	44-46	45	7.7	52.3	52.3	52.3	51.9	51.7	51.8	6.96E-07	6.89E-07	1.02E-03	1.01E-03	0.96
	46-48	47	7	48	48.2	48.1	47.5	47.4	47.45	7.05E-07	6.95E-07	9.34E-04	9.22E-04	1.35
	48-50	49	7.6	53.8	53.8	53.8	53.2	53.1	53.15	7.25E-07	7.17E-07	1.04E-03	1.03E-03	1.21
	50-52	51	7.8	57.2	57.2	57.2	56.2	56.6	56.4	7.51E-07	7.40E-07	1.11E-03	1.09E-03	1.40
	52-54	53	7.7	57.8	57.9	57.85	57.3	57.3	57.3	7.69E-07	7.62E-07	1.12E-03	1.11E-03	0.95
	54-56	55	8.2	62.2	62.2	62.2	61.5	61.8	61.65	7.76E-07	7.69E-07	1.21E-03	1.19E-03	0.88
	56-58	57	7.9	60.9	60.9	60.9	60.2	60.1	60.15	7.89E-07	7.79E-07	1.18E-03	1.17E-03	1.23
	58-60	59	7.6	55.2	55.4	55.3	54.7	54.5	54.6	7.45E-07	7.36E-07	1.07E-03	1.06E-03	1.27
	60-62	61	8	56.5	56.4	56.45	55.7	56.3	56	7.23E-07	7.17E-07	1.09E-03	1.09E-03	0.80
	62-64	63	8.1	57.9	57.9	57.9	57.1	57.1	57.1	7.32E-07	7.22E-07	1.12E-03	1.11E-03	1.38
	64-66	65	7.9	53.9	53.8	53.85	53	53	53	6.98E-07	6.87E-07	1.04E-03	1.03E-03	1.58
	66-68	67	8	55.5	55.3	55.4	55.1	54.9	55	7.09E-07	7.04E-07	1.07E-03	1.07E-03	0.72
	68-70	69	7.7	52.5	52.5	52.5	52	51.8	51.9	6.99E-07	6.91E-07	1.02E-03	1.01E-03	1.14
	70-72	71	7.7	50.9	50.8	50.85	50.2	50.2	50.2	6.77E-07	6.68E-07	9.87E-04	9.75E-04	1.28
	72-74	73	8.4	55.3	55.3	55.3	54.7	54.7	54.7	6.74E-07	6.67E-07	1.07E-03	1.06E-03	1.08
	74-76	75	8	50.4	50.3	50.35	50	49.8	49.9	6.45E-07	6.39E-07	9.78E-04	9.69E-04	0.89
	76-77.5	77	8.2	49.3	49.3	49.3	49	49.1	49.05	6.16E-07	6.13E-07	9.57E-04	9.53E-04	0.51
	77.5-79.5	78.5	6.8	46.5	46.7	46.6	46.4	46.4	46.4	7.03E-07	7.00E-07	9.05E-04	9.02E-04	0.43
	79.5-81.5	80.5	7.1	46.1	45.9	46	45.8	45.7	45.75	6.65E-07	6.61E-07	8.94E-04	8.89E-04	0.54
	81.5-83.5	82.5	7.6	51	50.9	50.95	50.6	50.5	50.55	6.87E-07	6.82E-07	9.89E-04	9.81E-04	0.79
	83.5-85.5	84.5	7.6	52	52.1	52.05	51.8	51.5	51.65	7.02E-07	6.96E-07	1.01E-03	1.00E-03	0.77
	85.5-87.5	86.5	7.8	51.8	51.7	51.75	51.5	51.5	51.5	6.80E-07	6.77E-07	1.00E-03	10.00E-04	0.48

	87.5-89.5	88.5	9	51.7	51.6	51.65	51.3	51.4	51.35	5.88E-07	5.85E-07	1.00E-03	9.97E-04	0.58
	89.5-91.5	90.5	7.5	36.9	36.8	36.85	36.7	36.5	36.6	5.05E-07	5.02E-07	7.18E-04	7.13E-04	0.68
	91.5-93.5	92.5	7.6	37.4	37.3	37.35	37.4	36.9	37.15	5.05E-07	5.03E-07	7.28E-04	7.24E-04	0.54
	93.5-95.5	94.5	7.6	40.1	39.9	40	40.1	40	40.05	5.41E-07	5.42E-07	7.79E-04	7.80E-04	-0.12
	95.5-97.5	96.5	7.6	47	46.9	46.95	46.9	46.9	46.9	6.34E-07	6.33E-07	9.12E-04	9.11E-04	0.11
	97.5-99.5	98.5	7.4	43.8	43.7	43.75	43.5	43.3	43.4	6.07E-07	6.02E-07	8.51E-04	8.44E-04	0.80
	99.5-101.5	100.5	8	49.5	49.5	49.5	49.3	49.2	49.25	6.34E-07	6.31E-07	9.61E-04	9.56E-04	0.51
	101.5-103.5	102.5	7.6	51.2	51.3	51.25	51	50.8	50.9	6.91E-07	6.86E-07	9.95E-04	9.88E-04	0.68
	103.5-105.5	104.5	7.7	52.6	52.6	52.6	51.7	52	51.85	7.00E-07	6.90E-07	1.02E-03	1.01E-03	1.43
	105.5-107.5	106.5	7.6	53.3	53	53.15	52.7	52.6	52.65	7.17E-07	7.10E-07	1.03E-03	1.02E-03	0.94
	107.5-109.5	108.5	7.7	52.6	53.1	52.85	51.9	52	51.95	7.03E-07	6.91E-07	1.03E-03	1.01E-03	1.70
	109.5-111.5	110.5	7.4	51.1	51	51.05	50.5	50.4	50.45	7.07E-07	6.99E-07	9.91E-04	9.79E-04	1.18
	111.5-113.5	112.5	7.8	50.5	50.5	50.5	50.2	50.1	50.15	6.64E-07	6.59E-07	9.80E-04	9.74E-04	0.69
	113.5-115.5	114.5	7.4	45.3	45.3	45.3	45.1	45	45.05	6.28E-07	6.25E-07	8.80E-04	8.76E-04	0.55
	115.5-117.5	116.5	7.4	45.1	45	45.05	44.6	44.8	44.7	6.25E-07	6.20E-07	8.76E-04	8.69E-04	0.78
	117.5-119.5	118.5	7.6	48.9	48.9	48.9	48.5	48.4	48.45	6.60E-07	6.54E-07	9.50E-04	9.41E-04	0.92
	119.5-121.5	120.5	7.4	48	47.6	47.8	47.6	47.6	47.6	6.62E-07	6.60E-07	9.28E-04	9.25E-04	0.42
	121.5-123.5	122.5	7.8	47.5	47.6	47.55	47.2	47.1	47.15	6.25E-07	6.20E-07	9.24E-04	9.16E-04	0.84
	123.5-125.5	124.5	8	52.8	52.7	52.75	52.2	52	52.1	6.76E-07	6.67E-07	1.02E-03	1.01E-03	1.23
	125.5-127.5	126.5	7.3	49.6	49.7	49.65	49.3	49.2	49.25	6.97E-07	6.92E-07	9.64E-04	9.56E-04	0.81
Stratum 2	127.5-129.5	128.5	7.9	52.5	52.4	52.45	52.2	51.9	52.05	6.80E-07	6.75E-07	1.02E-03	1.01E-03	0.76
Continued	129.5-131.5	130.5	7.6	53.7	53.5	53.6	53.2	53.2	53.2	7.23E-07	7.17E-07	1.04E-03	1.03E-03	0.75
	131.5-133.5	132.5	7.3	48.9	49	48.95	48.9	48.8	48.85	6.88E-07	6.86E-07	9.51E-04	9.49E-04	0.20
	133.5-135.5	134.5	7.9	55	54.3	54.65	54.9	54.8	54.85	7.09E-07	7.11E-07	1.06E-03	1.06E-03	-0.37
	135.5-137.5	136.5	7.3	50.7	50.7	50.7	50.6	50.5	50.55	7.12E-07	7.10E-07	9.84E-04	9.81E-04	0.30
	137.5-139.5	138.5	7.5	49.4	49.5	49.45	49.3	49.3	49.3	6.76E-07	6.74E-07	9.60E-04	9.57E-04	0.30
	139.5-141.5	140.5	7.4	48.2	48.1	48.15	48.1	48.1	48.1	6.67E-07	6.67E-07	9.35E-04	9.34E-04	0.10
	141.5-143.5	142.5	7.4	47.7	47.7	47.7	47.7	47.4	47.55	6.61E-07	6.59E-07	9.27E-04	9.24E-04	0.31
Stratum 3	143.5-145.5	144.5	7.1	46.9	47.5	47.2	46.7	47	46.85	6.82E-07	6.77E-07	9.17E-04	9.10E-04	0.74
	145.5-147.5	146.5	7.2	45.6	45.4	45.5	45.5	45.6	45.55	6.48E-07	6.49E-07	8.84E-04	8.85E-04	-0.11
	147.5-149.5	148.5	7.1	42.1	41.8	41.95	42.2	41.9	42.05	6.07E-07	6.08E-07	8.16E-04	8.18E-04	-0.24
	149.5-151.5	150.5	7.2	46.4	48.4	47.4	46.6	46.4	46.5	6.75E-07	6.63E-07	9.21E-04	9.04E-04	1.90
	151.5-153.5	152.5	7.2	43	43.5	43.25	43	42.9	42.95	6.17E-07	6.13E-07	8.41E-04	8.35E-04	0.69
	153.5-155.5	154.5	7.3	40.5	41.5	41	40.4	40.4	40.4	5.77E-07	5.69E-07	7.98E-04	7.86E-04	1.46
	155.5-157.5	156.5	6.4	41.6	41.6	41.6	41.6	41.5	41.55	6.68E-07	6.67E-07	8.09E-04	8.08E-04	0.12
	157-159	158	7.7	42	42.1	42.05	42	42.1	42.05	5.61E-07	5.61E-07	8.18E-04	8.18E-04	0.00
	159-161	160	7.5	37.1	37.7	37.4	37.2	37.1	37.15	5.13E-07	5.10E-07	7.29E-04	7.24E-04	0.67
	161-163	162	7.5	37.8	37.7	37.75	37.6	37.5	37.55	5.18E-07	5.15E-07	7.35E-04	7.31E-04	0.53
	163-165	164	8	46.2	46.1	46.15	46.7	46	46.35	5.92E-07	5.94E-07	8.97E-04	9.01E-04	-0.43
	165-167	166	7.7	39.6	39.5	39.55	39.4	39.3	39.35	5.28E-07	5.25E-07	7.70E-04	7.66E-04	0.51
	167-169	168	7.9	41.8	41.8	41.8	41.8	41.9	41.85	5.43E-07	5.44E-07	8.13E-04	8.14E-04	-0.12
	169-171	170	8	32.7	33	32.85	32.9	32.7	32.8	4.23E-07	4.22E-07	6.41E-04	6.40E-04	0.15
	171-173	172	8.3	11.3	11.3	11.3	11.1	11.6	11.35	1.44E-07	1.45E-07	2.27E-04	2.28E-04	-0.44
	173-175	174	7.9	22.8	22.4	22.6	23	23.3	23.15	2.97E-07	3.04E-07	4.44E-04	4.55E-04	-2.43
	175-177	176	8.3	23	23	23	23	23	23	2.87E-07	2.87E-07	4.52E-04	4.52E-04	0.00
	177-179	178	7.6	32.7	32.6	32.65	33	33	33	4.43E-07	4.47E-07	6.37E-04	6.44E-04	-1.07
	179-181	180	8.1	99.3	98.9	99.1	99.4	99.2	99.3	1.25E-06	1.25E-06	1.91E-03	1.92E-03	-0.20
	181-183	182	7.8	42.4	42	42.2	42.3	42.3	42.3	5.56E-07	5.57E-07	8.21E-04	8.23E-04	-0.24
	183-185	184	7.8	66.9	67	66.95	67	67.2	67.1	8.78E-07	8.80E-07	1.30E-03	1.30E-03	-0.22
	185-187	186	8.1	25.8	25.5	25.65	25.8	25.8	25.8	3.28E-07	3.30E-07	5.03E-04	5.06E-04	-0.58

Table 2. Magnetic susceptibility samples from east wall of Test Unit 3, Area D.

5LA3421 Elevation (m)	Test Unit 3 Elevation below surface (cm)	Mass (g)	Low # 1 Freqencey (SI 0.1)	Low # 2 Frequency (SI 0.1)	Average Low Frequency	High # 1 Frequency (SI 0.1)	High # 2 Frequency (SI 0.1)	Average High Frequency	Mass Susceptibility (m^3/kg) LF	Mass Susceptibility (m^3/kg)HF	Volume Susceptibility (SI) LF	Volume Susceptibility (SI) HF	Frequency Dependence (%)
96.17	1	6.1	70.4	70.3	70.35	68.1	68.5	68.3	1.18E-06	1.14E-06	1.36E-03	1.32E-03	2.91
96.15	3	6.4	74.9	74.9	74.9	73.5	73.3	73.4	1.20E-06	1.17E-06	1.45E-03	1.42E-03	2.00
96.13	5	7	91.9	92	91.95	89.7	90.1	89.9	1.34E-06	1.31E-06	1.78E-03	1.74E-03	2.23
96.11	7	6.9	95.8	95.8	95.8	93.5	93.6	93.55	1.42E-06	1.38E-06	1.85E-03	1.81E-03	2.35
96.09	9	7.6	179.1	178.9	179	174.5	174.4	174.45	2.40E-06	2.34E-06	3.45E-03	3.36E-03	2.54
96.07	11	7.3	120.1	119.9	120	116.9	117.2	117.05	1.68E-06	1.63E-06	2.32E-03	2.26E-03	2.46
96.05	13	7.6	114.7	114.9	114.8	111.6	111.5	111.55	1.54E-06	1.50E-06	2.22E-03	2.15E-03	2.83
96.03	15	7.8	136.5	136.4	136.45	133	132.6	132.8	1.78E-06	1.73E-06	2.63E-03	2.56E-03	2.67
96.01	17	7.7	134.4	134.6	134.5	131.4	131.4	131.4	1.78E-06	1.74E-06	2.60E-03	2.54E-03	2.30
95.99	19	7.4	116.4	116.6	116.5	113.7	113.5	113.6	1.60E-06	1.57E-06	2.25E-03	2.19E-03	2.49
95.97	21	7.5	127.1	126.9	127	123.7	123.8	123.75	1.73E-06	1.68E-06	2.45E-03	2.39E-03	2.56
95.95	23	7.9	139.2	139.5	139.35	136	136	136	1.80E-06	1.75E-06	2.69E-03	2.62E-03	2.40
95.93	25	7.5	148.7	148.8	148.75	145.1	144.9	145	2.02E-06	1.97E-06	2.87E-03	2.80E-03	2.52
95.91	27	7.2	121.8	121.7	121.75	118.8	119.2	119	1.72E-06	1.68E-06	2.35E-03	2.30E-03	2.26
95.89	29	7	119.4	118.8	119.1	115.9	115.7	115.8	1.73E-06	1.69E-06	2.30E-03	2.24E-03	2.77
95.87	31	7.2	118.1	118.1	118.1	115.7	115.6	115.65	1.67E-06	1.64E-06	2.28E-03	2.23E-03	2.07
95.85	33	6.9	114.3	114.5	114.4	111.6	111.6	111.6	1.69E-06	1.65E-06	2.21E-03	2.15E-03	2.45
95.83	35	6.7	99.7	99.7	99.7	97.5	97.1	97.3	1.52E-06	1.48E-06	1.93E-03	1.88E-03	2.41
95.81	37	6.8	115.3	115.4	115.35	113	112.9	112.95	1.73E-06	1.69E-06	2.23E-03	2.18E-03	2.08
95.79	39	6.8	126.5	127.2	126.85	124.1	124.1	124.1	1.90E-06	1.86E-06	2.45E-03	2.40E-03	2.17
95.77	41	7.3	103.2	103.4	103.3	101	101.1	101.05	1.44E-06	1.41E-06	2.00E-03	1.95E-03	2.18
95.75	43	6.8	95.7	95.7	95.7	93.5	93.8	93.65	1.44E-06	1.41E-06	1.85E-03	1.81E-03	2.14
95.73	45	7.2	102.5	101.8	102.15	100.1	100.2	100.15	1.45E-06	1.42E-06	1.97E-03	1.93E-03	1.96
95.71	47	6.7	100.6	99.4	100	97.2	97.4	97.3	1.52E-06	1.48E-06	1.93E-03	1.88E-03	2.70
95.69	49	7.1	98.9	98.5	98.7	96.9	97.2	97.05	1.42E-06	1.39E-06	1.91E-03	1.88E-03	1.67
95.67	51	6.9	91.3	92	91.65	90.1	89.9	90	1.36E-06	1.33E-06	1.77E-03	1.74E-03	1.80
95.65	53	7.4	97.5	97.5	97.5	96.7	96.6	96.65	1.34E-06	1.33E-06	1.88E-03	1.87E-03	0.87
95.63	55	7.5	98.8	98.9	98.85	97.9	98.1	98	1.34E-06	1.33E-06	1.91E-03	1.89E-03	0.86
95.61	57	7.4	97.5	97.2	97.35	96.3	96.4	96.35	1.34E-06	1.33E-06	1.88E-03	1.86E-03	1.03
95.59	59	7.1	93.5	93.5	93.5	92.7	92.8	92.75	1.34E-06	1.33E-06	1.81E-03	1.79E-03	0.80
95.57	61	7.8	100.6	100.6	100.6	99.8	99.9	99.85	1.32E-06	1.31E-06	1.94E-03	1.93E-03	0.75
95.55	63	7.2	89.1	89.2	89.15	88.4	88.2	88.3	1.26E-06	1.25E-06	1.72E-03	1.71E-03	0.95
95.53	65	7.6	94.1	94.1	94.1	93.7	93.4	93.55	1.26E-06	1.26E-06	1.82E-03	1.81E-03	0.58
95.51	67	6.6	81.2	81.1	81.15	80.7	80.3	80.5	1.26E-06	1.25E-06	1.57E-03	1.56E-03	0.80
95.49	69	7.1	86.7	86.9	86.8	85.9	85.8	85.85	1.25E-06	1.23E-06	1.68E-03	1.66E-03	1.09
95.47	71	7	89.4	89.4	89.4	88.5	88	88.25	1.30E-06	1.29E-06	1.73E-03	1.71E-03	1.29
95.45	73	7.1	86.3	86.3	86.3	85.5	85.4	85.45	1.24E-06	1.23E-06	1.67E-03	1.65E-03	0.98
95.43	75	7	83.3	83.4	83.35	82.5	82.5	82.5	1.22E-06	1.20E-06	1.61E-03	1.60E-03	1.02
95.41	77	7.3	88.7	88.5	88.6	87.1	87.5	87.3	1.24E-06	1.22E-06	1.71E-03	1.69E-03	1.47
95.39	79	7	86.8	86.7	86.75	86	85.4	85.7	1.27E-06	1.25E-06	1.68E-03	1.66E-03	1.21
95.37	81	6.9	86.3	86.3	86.3	85.1	85.2	85.15	1.28E-06	1.26E-06	1.67E-03	1.65E-03	1.33
95.35	83	6.8	90.5	90.1	90.3	89.2	88.9	89.05	1.36E-06	1.34E-06	1.75E-03	1.72E-03	1.38
95.33	85	7.1	92.6	91.9	92.25	91.3	91.3	91.3	1.33E-06	1.31E-06	1.78E-03	1.76E-03	1.03
95.31	87	6.8	86.8	86.5	86.65	85.6	85.5	85.55	1.30E-06	1.28E-06	1.68E-03	1.65E-03	1.27

95.29	89	7.1	92.5	92.8	92.65	91.9	92.1	92	1.33E-06	1.32E-06	1.79E-03	1.78E-03	0.70
95.27	91	7.3	93.4	93.6	93.5	91.9	92.7	92.3	1.31E-06	1.29E-06	1.81E-03	1.78E-03	1.28
95.25	93	7	90.4	90.1	90.25	89.7	89.5	89.6	1.32E-06	1.31E-06	1.74E-03	1.73E-03	0.72
95.23	95	6.9	89.3	89.6	89.45	88.9	89	88.95	1.32E-06	1.32E-06	1.73E-03	1.72E-03	0.56
95.21	97	7.2	89	89.2	89.1	88.3	88.9	88.6	1.26E-06	1.26E-06	1.72E-03	1.71E-03	0.56
95.19	99	7.3	91.4	91.4	91.4	90.9	91	90.95	1.28E-06	1.27E-06	1.77E-03	1.76E-03	0.49
95.17	101	7.1	87.3	87.5	87.4	87.1	86.9	87	1.26E-06	1.25E-06	1.69E-03	1.68E-03	0.46
95.15	103	6.9	87.6	87.4	87.5	87.2	87.1	87.15	1.29E-06	1.29E-06	1.69E-03	1.68E-03	0.40

Figures

Figure 1. Oblique aerial view of Site 5LA3421 (courtesy of Fort Lewis College, Department of Anthropology; view to the west).

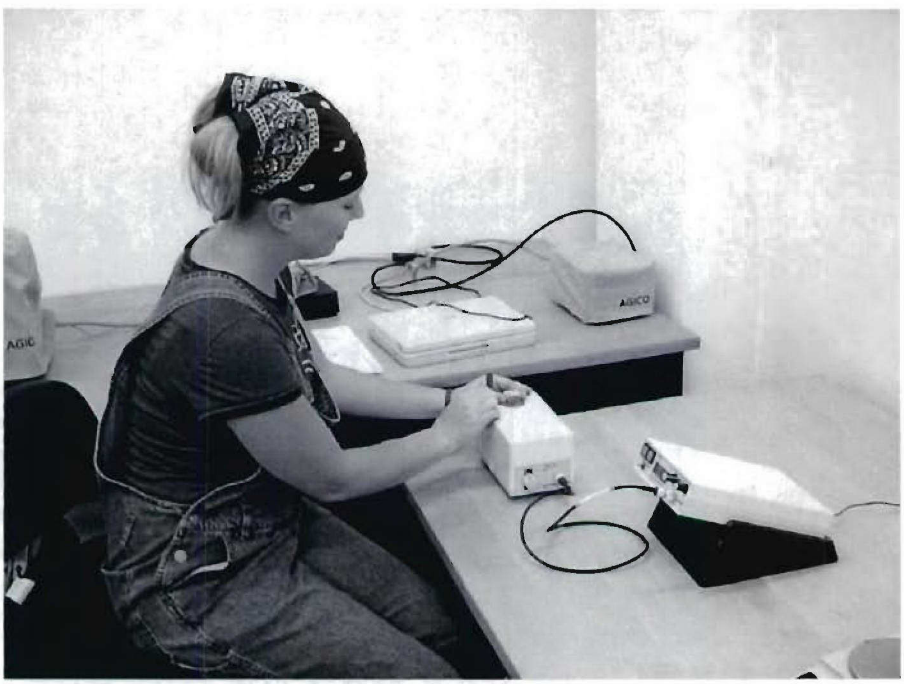

Figure 2. Operation of the Bartington MS2 magnetic susceptibility meter (courtesy of Minnesota State University-Moorhead, Department of Anthropology and Earth Science).

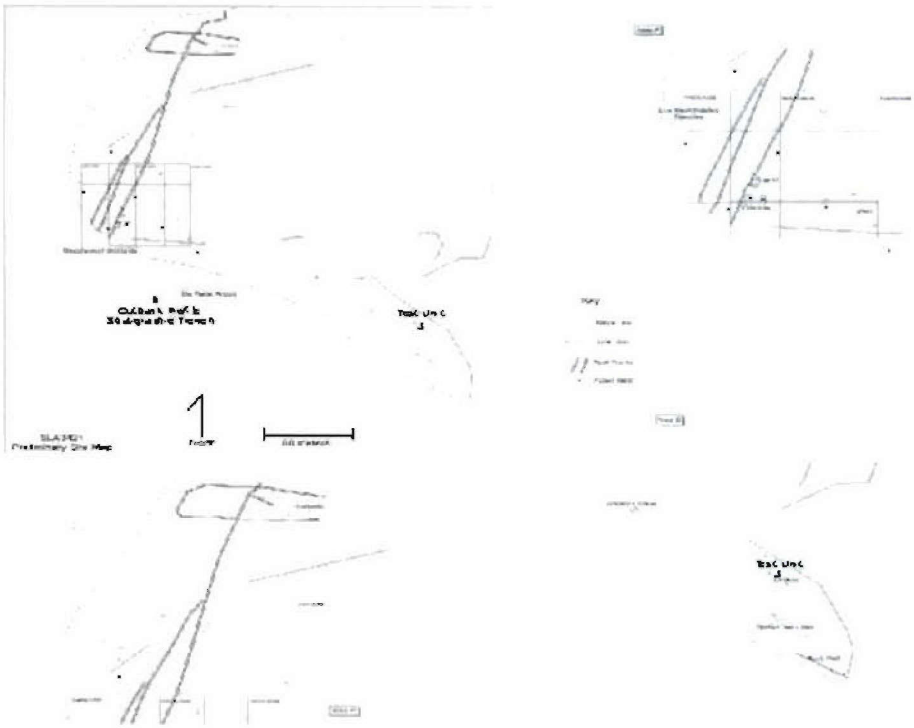

Figure 3. Location of magnetic susceptibility sample columns at 5LA3421 (courtesy of Fort Lewis College, Department of Anthropology).

Figure 4. General location of stratigraphic trench along right side of Big Water Arroyo (view to the northeast).

Figure 5. Removing magnetic susceptibility samples from cutbank profile in stratigraphic trench (view to the south).

Figure 6. View of rockshelter from Test Unit 3, Area D (view to the north).

Figure 7. Removal of magnetic susceptibility samples from east wall of Test Unit 3 (view to the northeast).

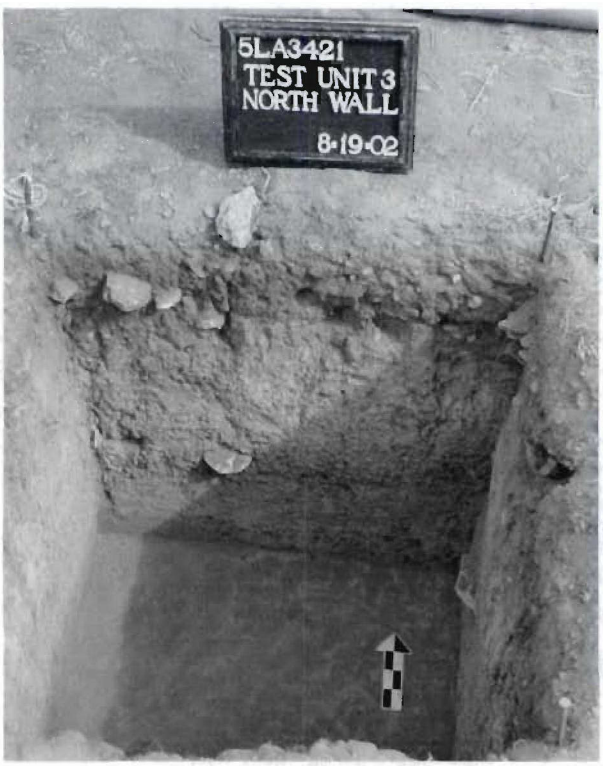

Figure 8. North wall profile of Test Unit 3 in Area D (courtesy of Fort Lewis College, Department of Anthropology; view to the north).

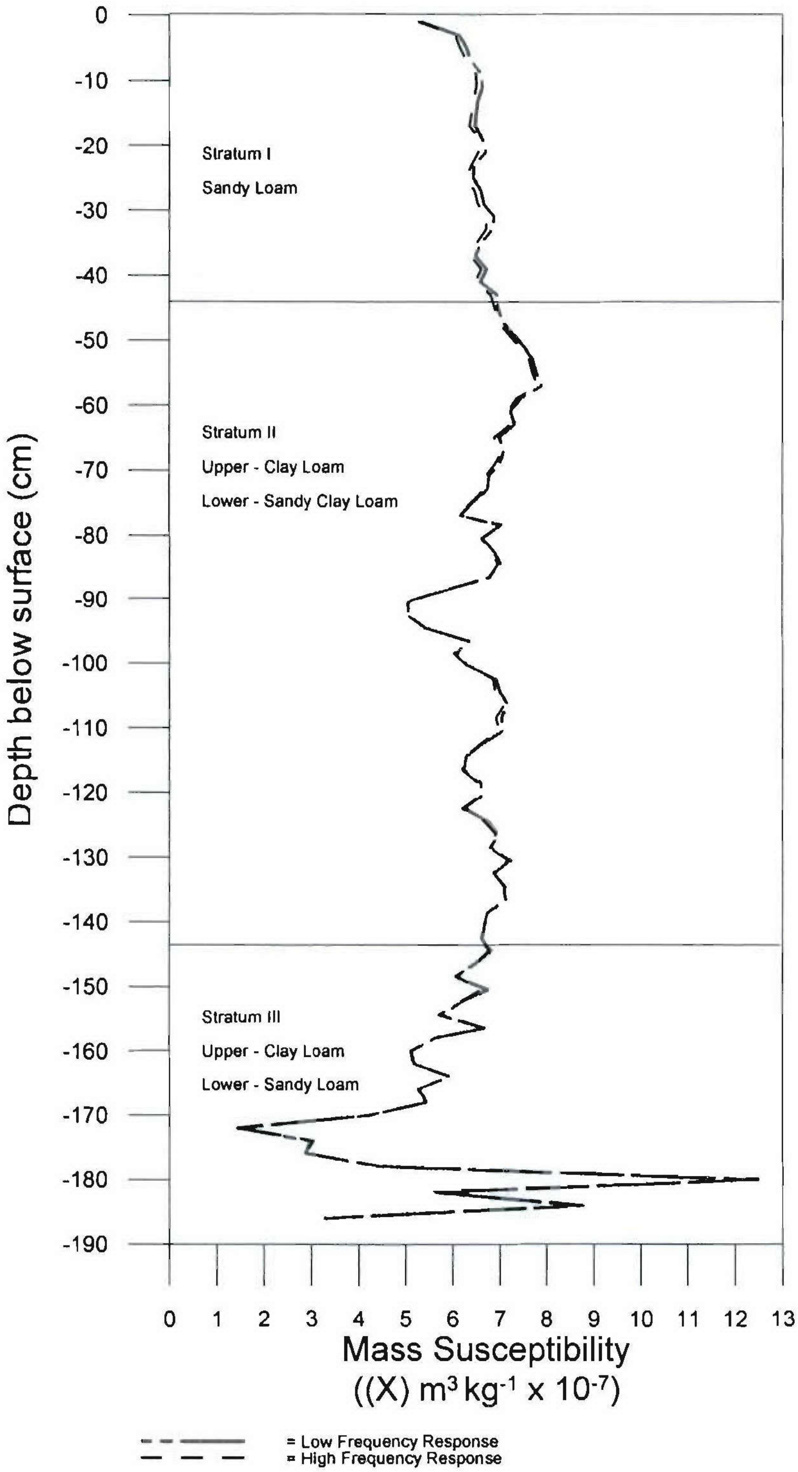

Figure 9. Mass susceptibility magnetostratigraphic profile from cutbank profile in stratigraphic trench.

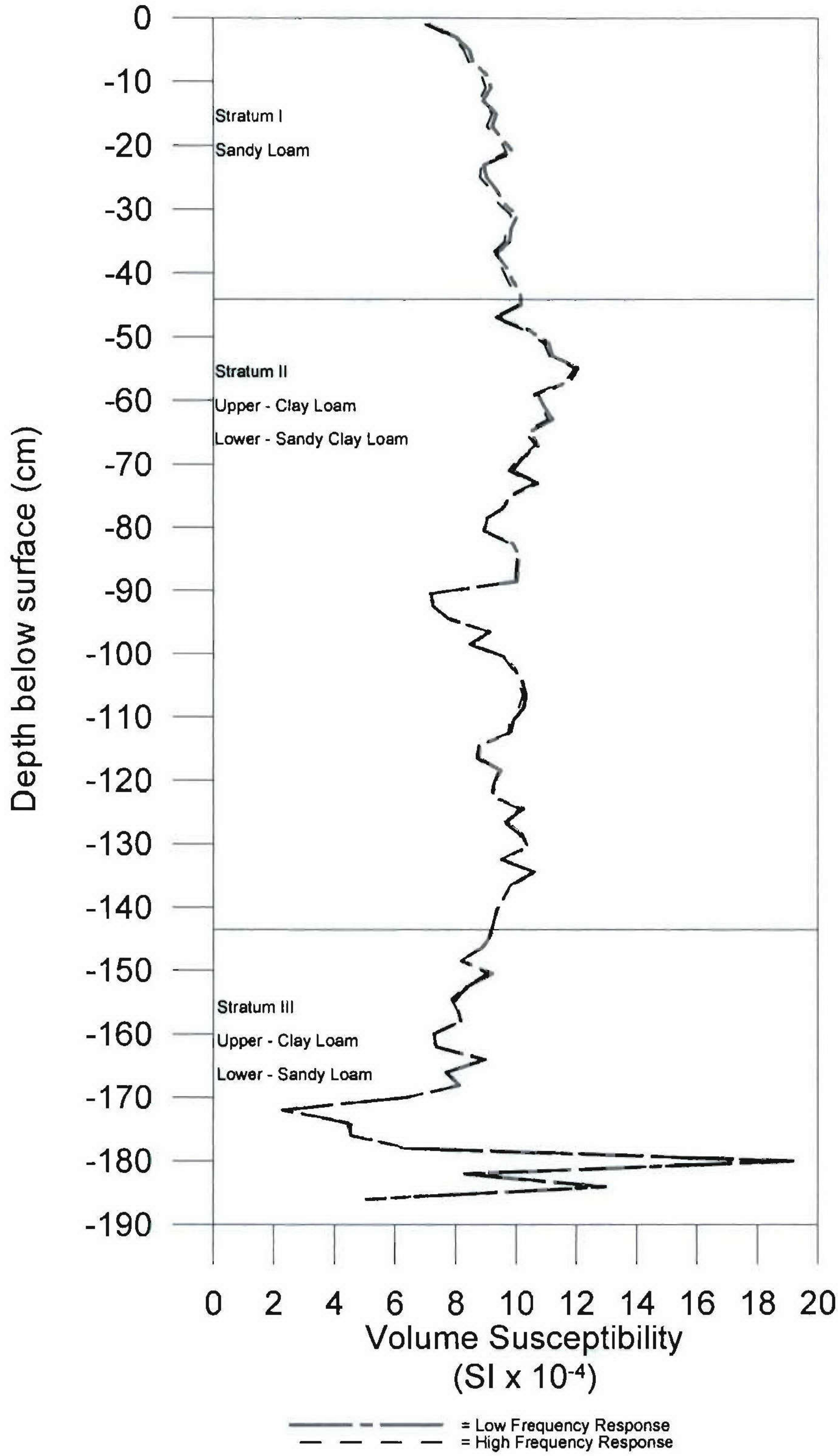

Figure 10. Volume susceptibility magnetostratigraphic profile from cutbank profile in stratigraphic trench.

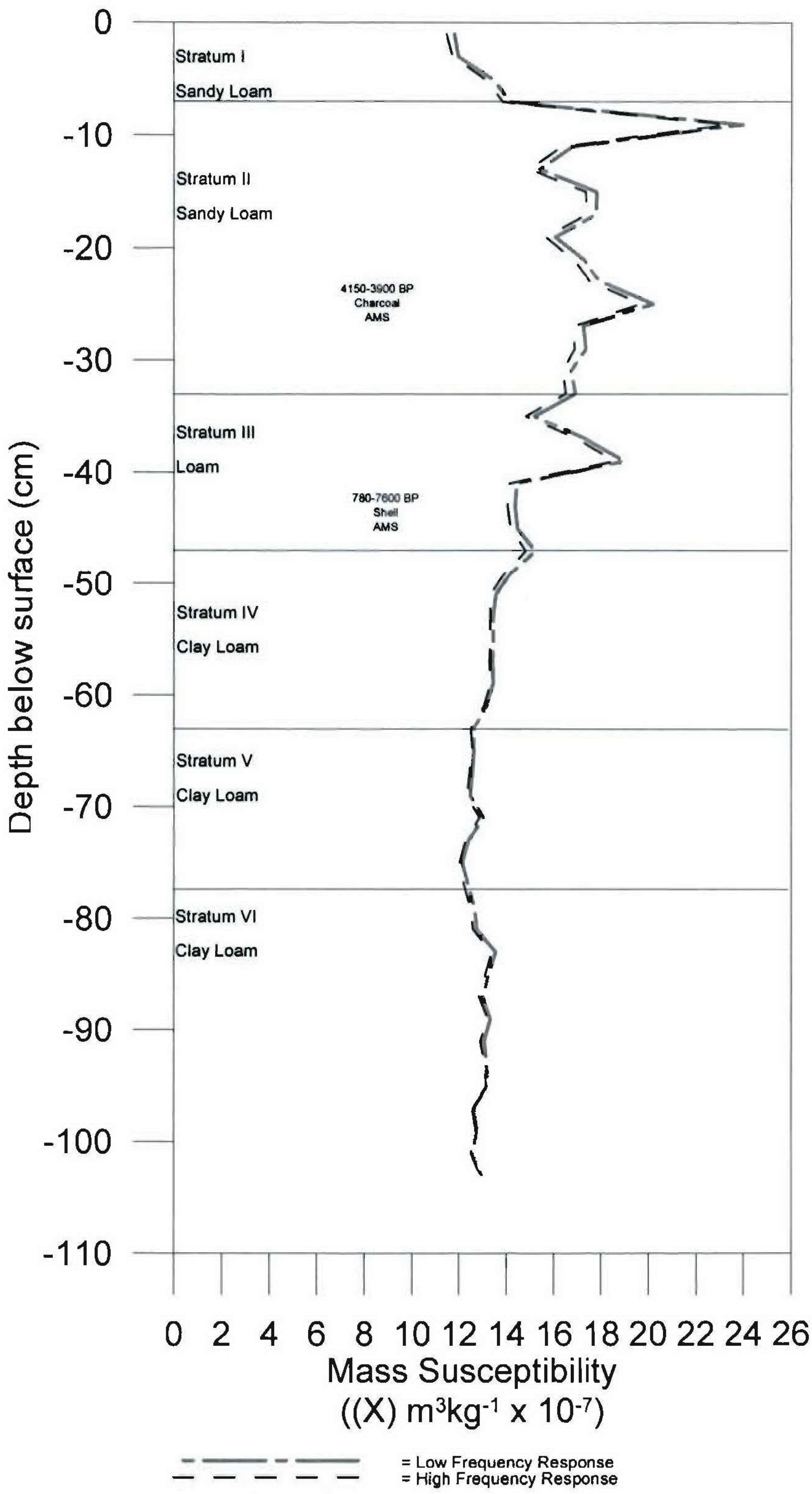

Figure 11. Mass susceptibility magnetostratigraphic profile from east wall of Test Unit 3.

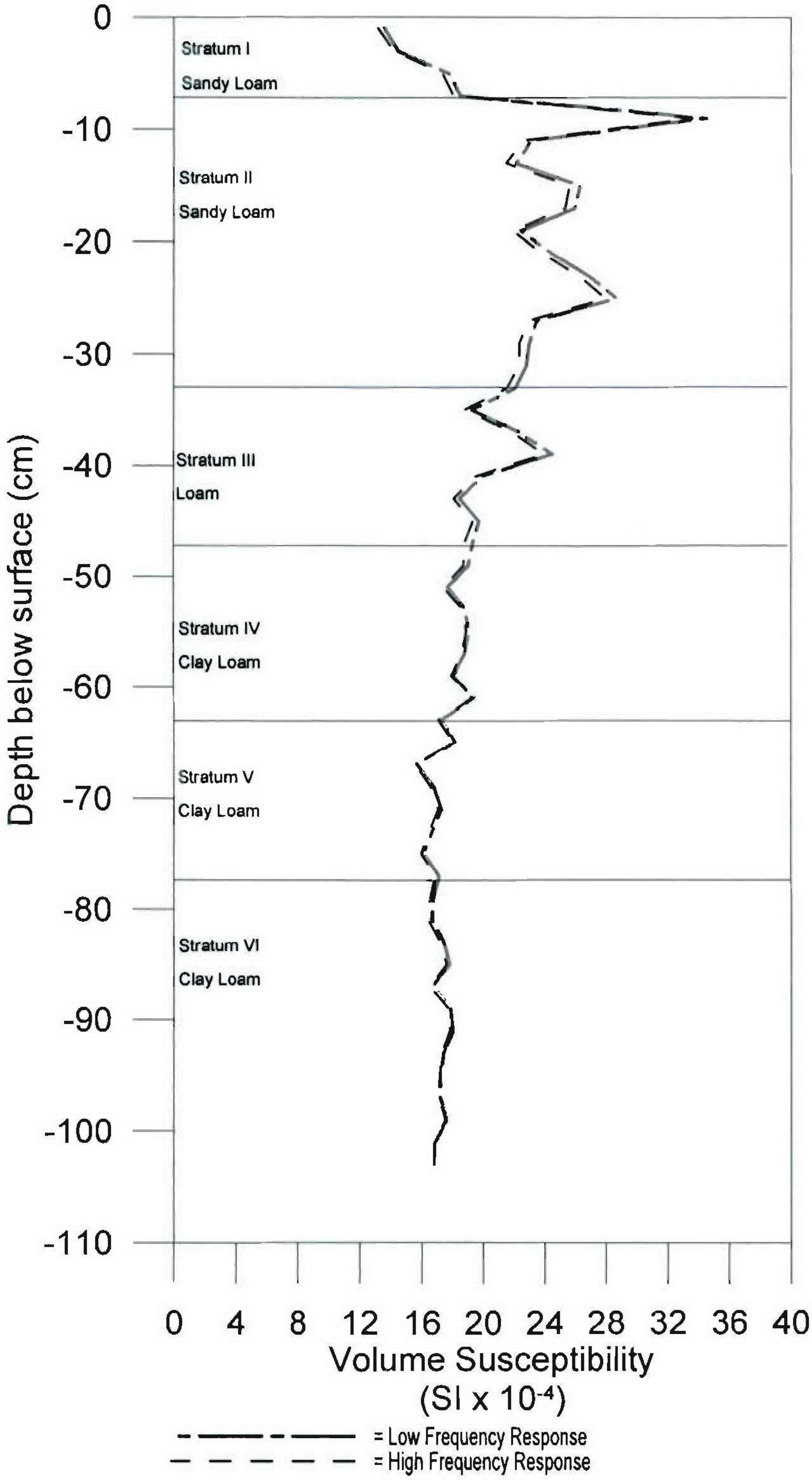

Figure 12. Volume susceptibility magnetostratigraphic profile from east wall of Test Unit 3.

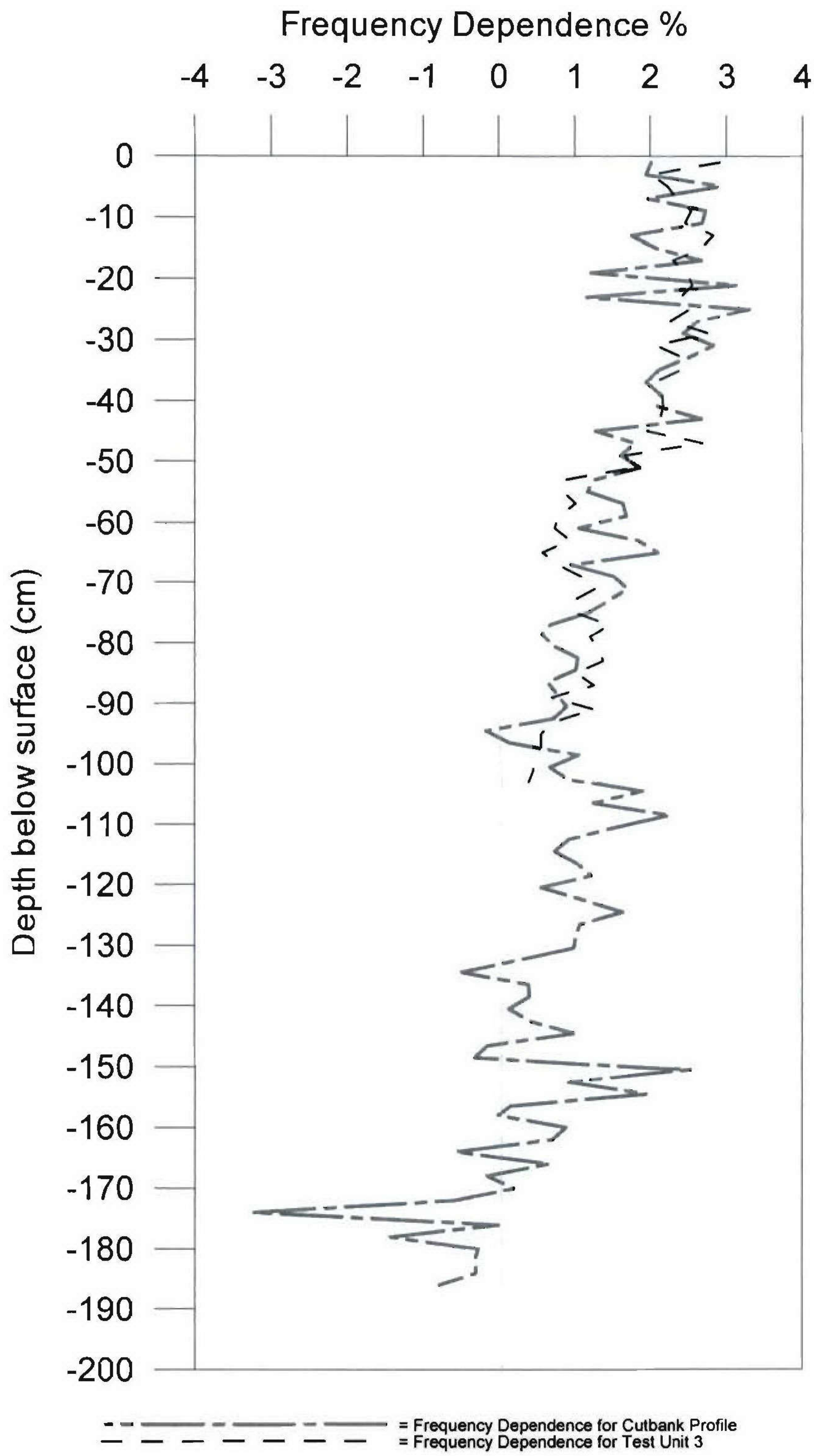

Figure 13. Frequency dependence percentages from the two mass magnetic susceptibility profiles.

APPENDIX II

MACROBOTANICAL ANALYSIS

By

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Introduction:

Analysis of 21 light fraction samples, 15 seed samples and 10 gastropod samples at 5LA3421 were undertaken to ascertain if macrobotanical and non-macrobotanical remains were present. If present, then insights into understanding prehistoric subsistence and subsistence patterns can lead to a better understanding of seasonality of site occupation, the possibility to reconstruct past plant and animal compositions and resource utilization patterns. The results yielded one species of fuel wood which was identified as Juniper (*Sabina monosperma* (formerly known as *Juniperus monosperma*)). Charred macrofloral remains recovered in the light fraction included one possible bastard toadflax (*Comandra umbellata*) seed fragment. Unburned macrofloral remains included numerous amaranth (*Amaranthus retroflexus*) seeds, buffalobur (*Solanum rostratum*) seeds, goosefoot (*Chenopodium* spp.) seeds, ground ivy (*Portulaca oleracea*) seeds, milk vetch (*Astragalus* spp.) seeds, mustard seeds, poverty weed (*Iva axillaris*) seeds, stickseed (*Lappula squarrosa*) seeds, sunflower (*Helianthus petiolaris*) seeds and verbena (*Verbena macdougalii*) seeds. Other seed species were present but were significantly fewer in numbers. Because these seeds are unburned, most people considered them to be modern in origin and should be dismissed as intrusive, i.e., not culturally significant (Minnis 1981:147). Non-botanical remains recovered in the light fraction included numerous unburned insect fragments along with animal scat. The presence of the unburned insect fragments and animal scat along with several non-native seeds indicate that there has been a significant amount of bioturbation from where these samples were collected.

Also recovered in the light fraction were seven species of gastropods which included *Fossaria parva*, *Gastrocopta procera*, *Pupilla* spp., *Pupilla muscorum*, *Succinea* spp., *Succinea grosvenori*, *Vallonia gracilicosta* and several gastropod eggs. None of the above species are good climatic indicators but rather represent terrestrial gastropods which live in dry to damp areas.

Methodology:

Ft. Lewis College floated the soil samples using an elutriator. An elutriator adds water from beneath the sample and separates or "floats" the organic matter free from its geologic host. The floated organic material was passed through a fine screen mesh (63 µm), collected and air dried. The heavy fraction was water screened through a 1.0 mm sieve. The material was air dried and examined for cultural (i.e., bone fragments, trade beads etc.) and non-cultural (gastropods) remains. All lithic material culturally significant were collected. The light fraction was sent to High Plains Macrobotanical Services for analysis. The light fraction was passed through a ¼", 2.0 mm, 1.0 mm and 500 µm sieves. Separating the light fraction into different sizes allows for more manageable viewing thereby decreasing the amount of time required to analyze a feature. The organic material was identified using a SWIFT stereo SM80 widefield microscope (10-40X). Recovered macrofloral materials were identified using the author's seed and charcoal collection and wood and seed identification manuals (i.e., Core *et al.* 1979; Davis 1993; Hoadley 1990; Kirkbride *et al.* 2000; Martin and Barkley 2000; Musil 1978; Panshin and Zeeuw 1970; Young and Young 1992). Identification of the gastropods were accomplished using Rocque 1966, 1967, 1968, 1969 and 1970.

Plant names are listed by both their common and scientific name. The term "spp." (such as *Pinus* spp.) indicates that the plant has been identified to the genus level but not to the species level. The term "seed" represents seeds, caryopses and achenes. Both scientific and common names are based on "Colorado Flora: Eastern Slope" by Weber 1990.

Results:

Over 6,000 unburned seeds and seed fragments along with 1,000+ gastropods were recovered from the light fraction samples (Table 1, Table 2 and Table 3). There were several samples where only a small percentage of the sample was actually picked, i.e., 10%. From this, an estimated number of seeds were calculated for those samples. With that said, an estimated 43,243 seeds were present in the light fraction samples analyzed. Of the actual seeds recovered, there were 29 unique seed species which were identified and included pigweed (*Amaranthus retroflexus),* daisy (*Aster* spp.), locoweed (*Astragalus* spp.), an unknown asteraceae species, mustard (*Brassica* spp.), sedge (*Carex* spp.), goosefoot (*Chenopodium* spp.), thistle (*Cirsium undulatum)*, bastard toadflax (*Comandra umbellata)*, morning glory/bindweed (*Convolvulus/ Ipomea* spp.), wallflower (*Erysimum* spp.), spurge (*Euphorbia* spp.), sunflower *(Helianthus petiolaris,)*, poverty weed (*Iva axillaris),* stickseed (*Lappula squarrosa*), fragile cactus (*Opuntia imbricata)*, prickly pear cactus (*Opuntia polyacantha*), knotweed (*Polygonum* spp.), locoweed, (*Oxytropis* spp.), purslane (*Portulaca oleracea*), chokecherry (*Prunus virginiana)*, juniper (*Sabina monosperma)*, blue elderberry (*Sambucus coerules*), wild rye (Sitanion spp.), buffalo bur (*Solanum rostratum)*, an unknown mustard species, verbena (*Verbena macdougalii),* vetch (*Vicia* spp.), and cockle bur (*Xanthium strumarium*).

Also recovered in the light fraction were five gastropod genera and seven gastropod species which were identified as *Fossaria parva*, *Gastrocopta procera*, *Pupilla* spp., *Pupilla muscorum*, *Succinea* spp., *Succinea grosvenori*, *Vallonia gracilicosta* and several gastropod eggs.

Several of the samples analyzed contained minor amounts of juniper (*Sabina monosperma*) (formerly known as *Juniperus monosperma*)) charcoal. Also present were numerous unburned insect fragments and animal scat.

Data tables are presented at the end of this appendix.

Discussion:

Ethnographic Review of Several Plant Species.

An ethnobotanical review is listed below. It should be noted that only the dominant plants are discussed. Also, in no way am I suggesting that the presence of these unburned seeds represent food storage. It is up to the reader to determine if these seeds are culturally significant.

Amaranth, or pigweed, (*Amaranthus retroflexus*) is an aggressive native annual weed and common throughout Colorado (Uva et al. 1997:94, Weber 1990:44, Whitson et al. 1992:11). Both the seeds and the leafy greens are edible according to Kindscher 1987:19-22. According to Johnson (1999:36-37) and Moerman (1999:65), amaranth plants have been

exploited by a number of Native American tribes.

Blue elderberry (*Sambucus coerules*) is a native perennial shrub found in Colorado (Webber 1990:139). The fruits were eaten raw or were dried for future use. Another use for this plant was fuel wood. Medicinally, the leaves were made into a poultice and used as a dermatological aid to reduce hand swelling. This plant has also been used as an antidiarrheal, a cathartic, a cold remedy, an analgesic, a cold remedy, a diaphoretic, an antirheumatic, a toothache remedy and has been used as a venereal aid for syphilis (Moerman 1992:512).

Buffalo-bur (*Solanum rostratum*) is a native annual and is a common weed of the plains and foothills from New Mexico to Wyoming (Kershaw et al. 1998:214, Weber 1990:351, Whitson1992:576). There is no evidence that this plant is edible, however, the literature does indicate that it has medicinal properties. This plant was used as a gastrointestinal aid to help settle an upset stomach (Moerman 1999:535) and Johnson (1999:787) stated that it was also used to help sooth a sore throat.

Goosefoot (*Chenopodium* spp.) is an aggressive native annual weed and is found throughout the region (Weber 1990:146, Whitson et al. 1992:269). Both the seeds and the leafy greens are edible and have been exploited by a number of Native American tribes (Kindscher 1987:79-82).

Ground ivy (*Portulaca oleracea*) is a fleshy prostrate annual which was accidentally introduced from Europe. According to Whitson et al., "Production of seeds throughout the growing season, and the ability to root again after cultivation makes this plant especially difficult to control. Seeds can remain dormant in the soil for years before germinating" (Whitson et al. 1992:523).

Juniper (*Sabina monosperma* (formerly known as *Juniperus monosperma*)) is a perennial tree located throughout the region (Weber 1990:31). Juniper is considered to have the following medicinal properties or uses: "analgesic, anticonvulsive, diaphoretic, disinfectant, diuretic, emetic, febrifuge, hemostat, stimulant (6) arthritis, asthma, children's ailments, common cold, congestion, cough, gastrointestinal disturbances, hepatitis, orthopedic ailments, skin ailments, stiffness, toothache, women's ailments. . . ." (Johnson 1999:445). Juniper has also been used as a fuel source.

A locoweed (*Oxytropis* spp.) species was present at 5LA3421 but could not be identified to the species level. With that said, there are numerous native species throughout the area (Weber 1990:193-194). A review of the ethnographic literature indicates that most plants are poisonous, however, locoweeds was used medicinally (Johnson 1999:579-580, Moerman 1999:374-375).

A milk vetch species was present at 5LA3421 but could not be identified to the species level. With that said, most milk vetch's (*Astragalus* spp.) are native perennials found throughout the region, and, most are considered poisonous (Stubbendieck et al. 1994:349). A review of the ethnographic literature indicates that some milk vetchs were used medicinally (Johnson 1999:94-100, Moerman 1999:112-114).

A mustard species was present at 5LA3421 but could not be identified to the species level. With that said, there are quite a few species which are native to the area. Unfortunately, there are also several species which have been accidentally introduced (Uva et al. 1997:170, Weber 1990:116-132, Whitson et al. 1992:213-241). A review of the ethnographic literature indicates that some mustard plants, both seeds and greens, were used

as a source of food while other species have medicinal properties (Johnson 1999:124-125, Moerman 1999:128).

Poverty weed (*Iva axillaris*) is a native perennial and a common weed found from Mexico to the Canadian border (Weber 1990:90, Whitson1992:147). No references were found indicating that this plant is edible. However, poverty weed is considered to have the following medicinal properties or uses: "abortifacient, analgesic, antidiarheal, contraceptive, used to treat the common cold, gastrointestinal disturbances and used to treat skin ailments" (Johnson 1999:435).

Both prickly pear cactus (*Opuntia polyacantha*) and cholla (*Opuntia impricata*) are native perennials and are found throughout the region (Webber 1990:133). Both the seeds, fruits and pads are edible (Johnson 1999:569, Kindscher 1987:154-157, Moerman 1999:367-368). It is thought that cacti pads may have also been used as a source of moisture and/or a buffering agent when found in deep roasting pits (Bach 2003).

Stickseed (*Lappula squarrosa*) is a native biennial weedy plant which grows in disturbed areas and is found throughout North America (Kershaw 1998:204,Weber 1990:113). There is no evidence that this plant is edible, however, the literature does indicate that it has medicinal properties. Stickseed was used as an analgesic. The roots were placed on hot stones and used as an inhalant. A snuff made from the raw root was used for headaches (Moerman 1999:295).

Sunflower (*Helianthus petiolaris*) is a native annual and a common weed found throughout the area (Weber 1990:88). The seeds are edible and have been exploited by a number of Native American tribes (Kindscher 1987:124-127, Moerman 1999:259). Moerman also stated that this species has been used as a dermatological aid on sores and it also helps to reduce swelling (Moerman 1999:259).

The literature does not state if verbena (*Verbena macdougalii*) is an annual or perennial, however, it is found throughout the San Luis area (Weber 1990:357). No references were found indicating whether or not this plant is edible. However, the literature does indicate that verbena was used by the Navajo and is considered to be a ceremonial plant (Moerman 1999:592).

A wall flower (*Erysimum* spp.) species was present at 5LA3421 but could not be identified to the species level. With that said, there are several species native to the area. Unfortunately, there are also several species which have been accidentally introduced (Uva et al. 1997:184, Weber 1990:126-127). A review of the ethnographic literature indicates that some wall flower plants were used as a source of medicine (Johnson 1999:327-328, Moerman 1999:226).

Wild rye (*Elymus* spp. (formerly known as *Sitanion* spp.)) grass was present at 5LA3421 but could not be identified to the species level. Wild rye does occur throughout the area (Weber 1990:268-269). Moerman 1999:533 states that wild rye was "used dry or green to strike patient with, before and after the shaman sucks the cause of the illness out of the patient."

Gastropod Ecology.

According to Rocque, *Fossaria parva* "lives in wet, marshy places, generally out of the water, on sticks, stones, or muddy flats. It is more prone to leave the water than any other

species of the family." (Rocque 1968:478). Rocque states that *Gastrocopta procera* is "found among vegetation: grass, shrubs, or woods area, but noted that woods are not required." (Rocque 1970:728-729). The ecology of *Pupilla muscorum* is "Especially abundant in rocky areas such as limestone quarries and escarpments, under limestone slabs with accumulations of rock powder and soil, and in joints of fissures of rocks." (Rocque 1970:732). The ecology of *Succinea grosvenori* is as follows: "This species, 'as now understood, tolerates an astonishingly wide range in practically all external conditions. It occurs from the warm humid Gulf coast to semi-arid areas in the great plains and mountain states, and in British America it extends north within the border of Northwestern Territory (Pilsbry, 1948, p. 821).'" (Rocque 1970:705). Finally, the ecology of *Vallonia gracilicosta* is listed as:

> Ecology– Henderson (1924, Naut. 37, p. 70) found this species, with others, in aspen groves near Tolland, Coloado. F. C. Baker (1929, Naut. 42, p. 135) recorded it from Birch Point, Big Bay, Vermilion Lake, St. Louis County, Minnesota, were he found it, along with other land snails, in wooded areas under logs, leaves, branches, and every sort of debris. Woodbury (1929, Naut. 43, p. 56) collected it in only one place in Zion National Park, Utah, under the dry leaves beneath cottonwood trees; he notes that it is rare and hard to find. Shimek (1930, Naut. 44, p. 40) stated that it is one of the most common land snails living in the prairie groves and border areas in Iowa; he denied that it's presence in fossil deposits is evidence of a cooler climate (Rocque 1970:762).

<u>Distribution Patterns of Seeds and Gastropods per Test Unit.</u>

In order to compare and contrast distribution patterns, all results were converted to 1 liter samples. The reason for this is because one cannot compare FS# 178 where 2.5 liters of soil were floated yielding an estimated 6,060 seeds against FS# 181, a 7.0 liter sample which yielded an estimated 9,280 seeds. When the results are converted to a one liter sample, one sees that FS#178 contained an estimated 2,424 seeds per liter while FS# 181 contained an estimated 1,325 seeds per liter.

Test Unit #3 provided the most data. The overall data indicated a higher concentration of seeds at or near the surface (Layer 1, Level 1) and decreases with an increase in depth (Figure 1). This might suggest seed decomposition increases with soil depth. Minnis states:

> What about uncharred seeds? We have reasonable evidence that many uncharred seeds are relatively modern, but what is the probability of uncharred prehistoric seeds being preserved? Few seeds live longer than a century, and most live for a much shorter period of time (Quick 1961: Harrington 1972: Justice and Bass 1978). A well-known opposing opinion is presented by Odum (1965), but in light of detailed experimental work, the longevity of seeds claimed by Odum seemed unlikely. Once seeds have died, one would expect decomposing organisms to decay the seed. Given the

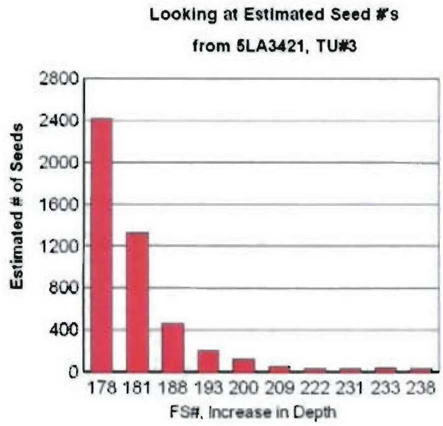

Figure 1: looking at the # of seeds/1L for TU#3.

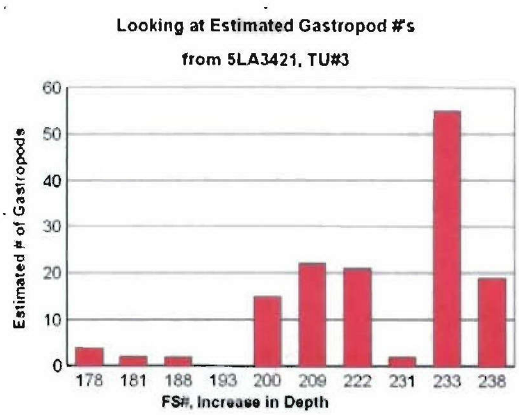

Figure 2: looking at the # of gastropods /1L for TU#3.

enormous production of seeds outlined at the beginning of this paper, one would expect that if seeds preserved for long periods of time, soil would be more seeds than soil. Clearly then, the vast majority of seeds decay (Minnis 1981:147).

Another interesting distribution pattern were the number of gastropods. Instead of the numbers decreasing with an increase in depth, one observes a more random pattern (Figure 2). An AMS date on gastropod material from FS#238 (Layer 3, Level 2) yielded a date of 6900 ± 40 B.P. (BETA 178249). This indicates that the gastropods are not modern in origin.

It is unknown if the number of gastropods per layer and level could possible be the result of some climatic indicator. A similar phenomenon is thought to have occurred prehistorical with bison. It is hypothesized that bison populations also fluctuated throughout time due to changes in the climate (see Brooks 1995). Stated another way, during periods of drought, bison populations would tend to decrease while periods of more moister and milder winters would increase the bison populations. It is unknown if the same can be said for gastropods.

TU#2 showed similar results as TU#3, however, the sample size was much smaller. TU#4 was more random with FS#253 showing both an increase in the number of seeds and gastropods then all of the other samples within that test unit (Table 4). It is unknown if this sample represents an increase in bioturbation (such as a krotovenia) or if it indicates a climatic change. TU#6 represented one sample while FS#30 and FS#34 represented hearth samples. Due to this, no patterns could be discerned.

Analysis of the Light Fraction.

A little background information is required in order to determine if the light fraction (roots and rootletts), can yield any valuable data. Generally speaking, a plant's roots are clustered just below the surface of the soil with minor amounts continuing to penetrate vertically and horizontally. With that said, and generally speaking, the deeper one excavates vertically, the amount of the root mass theoretically decreases. However, each plant species is unique. An example of a few species which do not follow this pattern is as follows; soapweed (*Yucca glauca*) has a maximum root depth of 7 feet, a working depth of 2.0 feet and a lateral spread of 20 to 32 feet while fragile cactus (*Opuntia fragilis*) has a maximum root depth of 1.3 feet, a working depth of 0.7 feet and a lateral spread of 1 to 1.3 feet (Weaver 1920:95). With that said, one must remember that there are general rules for root development but by no means are the rules black and white.

Analysis of the light fraction from 5LA3421 has yielded two anomalies– see Table 5. FS#233 and FS#253 showed a spike in root mass when compared to the surrounding samples. It is unknown why this is. What is interesting is that these two samples also contained higher amounts of gastropods when compared to the surrounding samples (see Table 4).

Hearth #1 and Hearth #2.

Hearth #1 (F.S.#30) yielded .05 grams of juniper charcoal, 63 unburned complete seeds and 131 seed fragments along with 15 unburned gastropods. Hearth #2 (F.S#34) yielded <.01 grams of juniper charcoal along with five unburned complete seeds and two seed fragments and no gastropods. It should be noted that Ft. Lewis College removed some of the charcoal for radiocarbon dating.

Due to the lack of charred macrofloral remains, it is unknown what purpose these hearths may have served. Guernsey reviewed ethnographical uses of hearths and found that food processing represents only one out of many possible hearth uses. Guernsey states that some hearth types were used as a source of 1) heat; 2) light; 3) food preparation; 4) fires in religious context; 5) hunting-food gathering methods; 6) tanning hides; 7) signaling; 8) fire as a tool in warfare; 9) production of tools; 10) keeping pests away, and 11) play fires (Guernsey 1984: Appendix F). Additional uses include 12) ceramic production; 13) a place to gather and socialize (Bach 1998:5-6) and, 14) a hearth used to heat stones for regulating and storing heat (Ives 1999:17.1-2).

Summary:

Macrofloral analysis was conducted on 21 light fraction samples, 15 seed samples and 10 gastropod samples at 5LA3421 to determine what macrobotanical remains along with non-botanical remains were present. The results yielded one species of fuel wood which was identified as Juniper (*Sabina monosperma* (formerly known as *Juniperus monosperma*)). Unburned macrofloral remains included numerous amaranth (*Amaranthus retroflexus*) seeds, buffalobur (*Solanum rostratum*) seeds, goosefoot (*Chenopodium* spp.) seeds, ground ivy (*Portulaca oleracea*) seeds, milk vetch (*Astragalus* spp.) seeds, mustard seeds, poverty weed (*Iva axillaris*) seeds, stickseed (*Lappula squarrosa*) seeds, sunflower (*Helianthus petiolaris*) seeds and verbena (*Verbena macdougalii*) seeds among others. Because these

seeds are unburned, most people considered them to be modern in origin and should be dismissed as intrusive, i.e., not culturally significant (Minnis 1981). With that said, it is interesting to note that the number of seeds recovered from each level tend to decrease with an increase in depth.

What is interesting is the distribution of the gastropods. Instead of the numbers decreasing with an increase in depth, one observes a more random pattern. Based on AMS dates, these gastropods are prehistoric and not modern in origin. Therefore, this might suggest a minor climatic change.

Table 4: Estimated Numbers of Seeds and Gastropods per 1 Liter.

FS#	TU#	Original Vol. (L)	# of Complete Seeds	Estimated # of Seeds per Liter	# of Complete Gastropods	Estimated # of Gastropods per Liter	RadioCarbon Date
30	---	5.5	63	11.45	15	2.73	580 ± 80 B.P.
34	---	2.0	4	2.00	0	0.00	
185	TU2	4.5	12820	2848.89	7	1.56	
189	TU2	5.0	1167	233.40	6	1.20	
196	TU2	8	2860	357.50	53	6.63	990 ± 40 B.P.
178	TU3	2.5	6060	2424.00	10	4.00	
181	TU3	7.0	9280	1325.71	12	1.71	
188	TU3	7.0	3230	461.43	14	2.00	
193	TU3	7.5	1520	202.67	0	0.00	
200	TU3	3.0	363	121.00	44	14.67	
209	TU3	8.0	425	53.13	172	21.50	3690 ± 40 B.P.
222	TU3	7.5	240	32.00	161	21.47	
231	TU3	5.0	170	34.00	31	6.2	
233	TU3	5.0	180	36.00	275	55.00	
238	TU3	6.0	181	30.17	112	18.67	6900 ± 40 B.P.
235	TU4	5.0	108	21.60	0	0.00	
244	TU4	5.0	20	4.00	0	0.00	2660 ± 110 B.P.
253	TU4	2.0	129	64.50	8	4.00	
266	TU4	2.5	16	6.40	0	0.00	
224	TU6	4.5	225	50.00	25	5.56	

Table 5: Analysis of the Light Fraction (Roots and Rootletts) at 5LA3421.

FS#	TU#	Original Volume (L)	Total Grams of Lite Fraction	Lite Fraction per 1L
30	--	5.5	44.8	**8.15**
34	--	2	18.37	**9.19**
185	TU#2	4.5	58.86	**13.08**
189	TU#2	5	25.27	**5.05**
196	TU#2	8	32.76	**4.10**
178	TU#3	2.5	122	**48.80**
181	TU#3	7	38.82	**5.55**
188	TU#3	7	26.9	**3.84**
193	TU#3	7.5	14.8	**1.97**
200	TU#3	3	6.31	**2.10**
209	TU#3	8	8.39	**1.05**
222	TU#3	7.5	5.42	**0.72**
231	TU#3	5	3.9	**0.78**
233	TU#3	5	12.97	**2.59**
238	TU#3	6	7.21	**1.20**
235	TU#4	5	24.41	**4.88**
244	TU#4	5	14.12	**2.82**
253	TU#4	2	19.65	**9.83**
266	TU#4	2.5	8.1	**3.24**
224	TU#6	4.5	12.41	**2.76**

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Test Unit 2 Macrobotanical Information

Provenience Layer	Level	Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
1	1	*Helianthus petiolaris*	seed	sunflower	1	
1	1	*Sabina monosperma*	seed	one-seed juniper	1	
1	1	*Camadra umbellata*	seed	bastard toad flax	1	
1	1	Unknown spp.	seed	unknown	1	
Subtotal					**4**	**0**
2	1	*Opuntia imbricata*	seed	cholla		7
2	1	*Sabina monosperma*	seed	one-seed juniper		1
2	1	*Sabina monosperma*	charcoal	one-seed juniper		
2	1	*Lapulla squarrosa*	seed	stickseed		
2	1	*Iva axillaris*	seed	ground ivy	23	13
2	1	*Helianthus petiolaris*	seed	sunflower	2	12
2	1	*Amaranthus retroflexus*	seed	amaranth	107	
2	1	*Solanum rostratum*	seed	buffalo bur	27	9
2	1	*Sambucus coerules*	seed	blue elderberry	2	
2	1	*Astragalus spp.*	seed	milk vetch		47
2	1	*Portulaca oleracea*	seed	ground ivy	216	42
2	1	*Brassica spp.*	seed	mustard	12	
2	1	*Oxytropis spp.*	seed	locoweed	1	
2	1	*Verbena macdougalii*	seed	verbena	2	
2	1	*Amaranthus retroflexus*	seed	amaranth	52	
2	1	*Chenopodium spp.*	seed	goosefoot	198	60
2	1	*Chenopodium spp. immature*	seed	goosefoot	66	
2	1	*Portulaca oleracea*	seed	ground ivy	386	110
2	1	unknown mustard spp.	seed	mustard	112	25
2	1	unknown mustard spp.	seed	mustard	45	
2	1	unknown spp.	seed		3	
2	1	immature seeds and frags	seed		66	12
Subtotal					**1320**	**338**
2	2	*Sabina monosperma*	charcoal	one-seed juniper		
2	2	*Helianthus petiolaris*	seed	sunflower	2	4
2	2	*Solanum rostratum*	seed	buffalo bur	3	
2	2	*Carex spp.*	seed	sedge	1	
2	2	*Iva axillaris*	seed	ground ivy	6	6
2	2	*Brassica spp.*	seed	mustard	44	4
2	2	*Verbena macdougalii*	seed	verbena	1	
2	2	*Amaranthus retroflexus*	seed	amaranth	75	10
2	2	*Eurphorbia sp.*	seed	euphorb	8	
2	2	*Portulaca oleracea*	seed	ground ivy	100	13
2	2	*Chenopodium spp.*	seed	goosefoot	389	48
2	2	*Portulaca oleracea*	seed	ground ivy	369	51
2	2	unknown seed	seed			1
2	2	immature seed fragments	seed			63
Subtotal					**998**	**200**
2	3	*Sabina monosperma*	charcoal	one-seed juniper		
2	3	*Opuntia polyacantha*	seed	prickly pear cactus		2
2	3	*Astragalus spp.*	seed	milk vetch	3	1
2	3	*Solanum rostratum*	seed	buffalo bur	19	
2	3	*Iva axillaris*	seed	poverty weed	49	1
2	3	*Helianthus petiolaris*	seed	sunflower	1	14
2	3	*Amaranthus retroflexus*	seed	amaranth	2	
2	3	*Sitanion spp.*	seed		1	
2	3	*Sambucus coerules*	seed	blue elderberry	1	
2	3	*Portulaca oleracea*	seed	ground ivy	92	12

Provenience Layer	Level	Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
2	3	*Chenopodium spp.*	seed	goosefoot	31	
2	3	*Portulaca oleracea*	seed	ground ivy	311	19
2	3	*Comandra umbellata*	seed	bastard toad flax	1	
2	3	unknown mustard spp	seed	mustard	16	
2	3	unknown spp.	seed		1	
2	3	immature seeds and frags	seed		6	
Subtotal					**634**	**49**
TOTAL					**2856**	**587**

Test Unit 3 Macrobotanical Information

Provenience Layer	Level	Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
1	1	Sitanion spp.	glume			2
1	1	*Solanum rostratum*	seed	buffalo bur	2	
1	1	*Lappula squarrosa*	seed	stickseed	4	
1	1	*Helianthus petiolaris*	seed	sunflower	4	
1	1	*Iva axillaris*	seed	poverty weed		2
1	1	*Sambucus coerules*	seed	blue elderberry	1	
1	1	*Portulaca oleracea*	seed	ground ivy	9	
1	1	*Sabina monosperma*	charcoal	one seed juniper		
1	1	*Sabina monosperma*	seed	one seed juniper		5
1	1	Chenopodium spp.	seed	goosefoot	29	
1	1	immature Chenopodium spp	seed	goosefoot	72	
1	1	*Amaranthus retroflexus*	seed	amaranth	2	
1	1	*Portulaca oleracea*	seed	ground ivy	182	25
1	1	immature seeds	seed		10	
1	1	unknown mustard spp.	seed		4	
Subtotal					**319**	**34**
1	2	*Sabina monosperma*	charcoal	one seed juniper		
1	2	*Sabina monosperma*	seed	one seed juniper		1
1	2	Sitanion spp.	seed		1	
1	2	*Helianthus petiolaris*	seed	sunflower	1	3
1	2	Astragalus spp.	seed	milk vetch		1
1	2	*Amaranthus retroflexus*	seed	amaranth	1	
1	2	*Portulaca oleracea*	seed	ground ivy	14	
1	2	Chenopodium spp.	seed	goosefoot	110	5
1	2	*Iva axillaris*	seed	ground ivy	3	
1	2	immature Chenopodium spp.	seed	goosefoot	41	
1	2	*Portulaca oleracea*	seed	ground ivy	351	12
1	2	unknown mustard spp.	seed	mustard	11	
Subtotal					**533**	**22**
1	3	*Sabina monosperma*	charcoal	one seed juniper		
1	3	*Sabina monosperma*	seed	one seed juniper	1	
1	3	*Helianthus petiolaris*	seed	sunflower	1	
1	3	*Sambucus coerules*	seed	blue elderberry	1	
1	3	*Iva axillaris*	seed	ground ivy	1	
1	3	*Amaranthus retroflexus*	seed	amaranth	3	
1	3	*Chenopodium spp.*	seed	goosefoot	2	
1	3	*Portulaca oleracea*	seed	ground ivy	7	
1	3	Chenopodium spp.	seed	goosefoot	63	
1	3	immature Chenopodium spp.	seed	goosefoot		9
1	3	*Portulaca oleracea*	seed	ground ivy	205	38
1	3	immature unknown mustard spp.	seed	mustard	28	

Provenience		Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
Layer	Level					
1	3	unknown mustard spp.	seed	mustard	45	
Subtotal					**357**	**47**
1	4	*Sabina monosperma*	charcoal	one seed juniper		
1	4	*Helianthus petiolaris*	seed	sunflower		1
1	4	Chenopodium spp.	seed	goosefoot	19	
1	4	*Portulaca oleracea*	seed	ground ivy	2	
1	4	*Portulaca oleracea*	seed	ground ivy	140	4
1	4	unknown mustard spp.	seed	mustard	1	
Subtotal					**162**	**5**
1	5	*Sabina monosperma*	seed	one seed juniper	1	
1	5	*Sabina monosperma*	charcoal	one seed juniper		
1	5	*Helianthus petiolaris*	seed	sunflower		2
1	5	*Lappula squarrosa*	seed	stickseed	1	
1	5	Aster spp.	seed		1	
1	5	*Portulaca oleracea*	seed	ground ivy	9	
1	5	Erysimum spp.	seed	wallflower	4	
1	5	Astragalus spp.	seed	locoweed	1	
1	5	*Amaranthus retroflexus*	seed	amaranth	1	
1	5	Chenopodium spp.	seed	goosefoot	40	7
1	5	*Portulaca oleracea*	seed	ground ivy	301	29
1	5	immature seed fragments	seed			19
1	5	unknown mustard spp.	seed	mustard	4	
Subtotal					**363**	**57**
2	1	*Sabina monosperma*	charcoal	one seed juniper		
2	1	*Helianthus petiolaris*	seed	sunflower	2	3
2	1	Chenopodium spp.	seed	goosefoot	19	
2	1	Asteraceae spp.	seed	sunflower family	1	
2	1	*Portulaca oleracea*	seed	ground ivy	1	
2	1	*Portulaca oleracea*	seed	ground ivy	64	
2	1	immature seeds	seed		7	
2	1	unknown mustard spp.	seed	mustard	2	
Subtotal					**96**	**3**
2	2	Portulaca oleracea	seed	ground ivy	1	
2	2	Chenopodium spp.	seed	goosefoot	4	1
Subtotal					**5**	**1**
2	3	*Sabina monosperma*	charcoal	one seed juniper		
2	3	Chenopodium spp.	seed	goosefoot		2
2	3	immature Chenopodium spp.	seed	goosefoot	2	
2	3	*Portulaca oleracea*	seed	ground ivy	22	
2	3	unknown mustard spp.	seed	mustard	1	
Subtotal					**25**	**2**
2	4	*Sabina monosperma*	charcoal	one seed juniper		
2	4	Chenopodium spp.	seed	goosefoot	8	
2	4	*Portulaca oleracea*	seed	ground ivy	161	8
2	4	immature seeds	seed		1	
Subtotal					**170**	**8**
3	1	*Helianthus petiolaris*	seed	sunflower		2
3	1	Chenopodium spp.	seed	goosefoot	9	4
3	1	Astragalus spp.	seed	milk vetch	1	
3	1	*Iva axillaris*	seed	poverty weed		1
3	1	seed fragments	seed			11
Subtotal					**10**	**18**
3	2	*Helianthus petiolaris*	seed	sunflower	1	
3	2	Chenopodium spp.	seed	goosefoot	3	1
3	2	*Portulaca oleracea*	seed	ground ivy	21	
3	2	Oxytropis spp.	seed	locoweed	2	

Provenience		Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
Layer	Level					
3	2	immature seeds	seed		12	
Subtotal					**39**	**1**
TOTAL					**2079**	**198**

Test Unit 4 Macrobotanical Information

Provenience		Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
Layer	Level					
3	5	Chenopodium spp.	seed	goosefoot	16	
3	5	immature Chenopodium spp.	seed	goosefoot	9	
3	5	*Portulaca oleracea*	seed	ground ivy	70	5
3	5	Polygonum spp.	seed	knotweed	1	
3	5	*Helianthus petiolaris*	seed	sunflower	1	
3	5	Asteraceae spp.	seed	sunflower family	1	
3	5	immature seeds	seed		9	
3	5	unknown mustard spp.	seed	mustard	1	
Subtotal					**108**	**5**
3	6	*Sabina monosperma*	charcoal	one seed juniper		
3	6	Sitanion spp.	seed		2	
3	6	*Portulaca oleracea*	seed	ground ivy	9	
3	6	Polyonum spp.	seed	knotweed	2	
3	6	Brassica spp.	seed	mustard	4	
3	6	Chenopodium spp.	seed	goosefoot	4	
3	6	seed fragments	seed			8
Subtotal					**21**	**8**
3	7	*Sabina monosperma*	charcoal	one seed juniper		
3	7	*Helianthus petiolaris*	seed	sunflower		11
3	7	Sitanion spp.	seed			6
3	7	Vicia spp.	seed	vetch		1
3	7	Chenopodium spp.	seed	goosefoot	8	
3	7	*Portulaca oleracea*	seed	ground ivy	99	4
3	7	Polygonum spp.	seed	knotweed	5	
3	7	*Verbena macdougali*	seed	verbena	2	
3	7	*Sambucus coerules*	seed	blue elderberry	1	
3	7	*Comandra umbellata*	seed	bastard toadflax	1	1
3	7	*Cirsium undulatum*	seed	thistle	1	
3	7	*unknown seed*	seed		1	
3	7	immature seeds	seed		14	
Subtotal					**132**	**23**
3	8	Sitanion spp.	bract		6	
3	8	*Sambucus coerules*	seed	blue elderberry	1	
3	8	*Portulaca oleracea*	seed	ground ivy	4	
3	8	Chenopodium spp.	seed	goosefoot	3	
3	8	Polygonum spp.	seed	knotweed	1	
3	8	immature seeds	seed		1	
Subtotal					**16**	**0**
TOTAL					**227**	**36**

Test Unit 6 Macrobotanical Information

Provenience Layer	Level	Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
2	3	*Sabina monosperma*	charcoal	one seed juniper		
2	3	Vicia spp.	seed	vetch	1	3
2	3	Convolvulus/Ipomea spp.	seed	bind weed/morning glory	1	
2	3	Sitanion ssp.	seed			2
2	3	Chenopodium spp.	seed	goosefoot	95	2
2	3	*Portulaca oleracea*	seed	ground ivy	110	
2	3	*Helianthus petiolaris*	seed	sunflower		3
2	3	unknown mustard spp.	seed	mustard	8	
2	3	immature seeds	seed		10	
TOTAL	**27**				**225**	**10**

Hearth 1

E 1/2 Layer 1

Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
Sabina monosperma	charcoal	one seed juniper		
Solanum rostratum	seed	buffalo bur	35	8
Helianthus petiolaris	seed	sunflower	2	3
Portulaca oleracea	seed	ground ivy	7	
Lappula squarrosa	seed	stickseed	1	
Sabina monosperma	seed	one seed juniper		1
Chenopodium spp.	seed	goosefoot	11	
Erysimum spp.	seed	wallflower	2	
unknown mustard spp.	seed	mustard	4	
Verbena macdougalii	seed	verbena	1	
seeds fragments	seed			7
immature seeds	seed			112
TOTAL			**63**	**131**

W1/2

Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
Helianthus petiolaris	seed	sunflower		1
Solanum rostratum	seed	buffalo bur	17	
Sambucus coerules	seed	blue elderberry	2	
Portulaca oleracea	seed	ground ivy	1	
TOTAL			**20**	**1**

Hearth 2

Identification	Part	Common Name	Uncharred Whole	Uncharred Fragment
Sabina monosperma	charcoal			
Helianthus petiolaris	seed	sunflower		2
Chenopodium spp.	seed	goosefoot	4	
Portulaca oleracea	seed	ground ivy	1	
TOTAL			**5**	**2**

APPENDIX III

RADIOCARBON DATES

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-21.5:lab. mult=1)

Laboratory number: **Beta-178247**

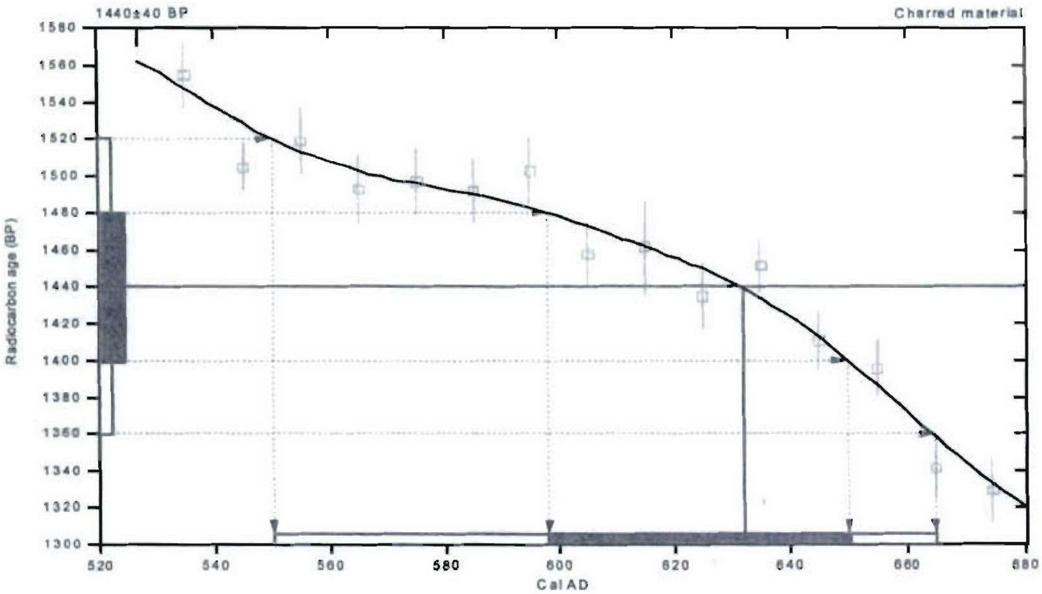
Conventional radiocarbon age: **1440±40 BP**

2 Sigma calibrated result: (95% probability) **Cal AD 550 to 660 (Cal BP 1400 to 1280)**

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 630 (Cal BP 1320)

1 Sigma calibrated result: (68% probability) Cal AD 600 to 650 (Cal BP 1350 to 1300)



References:

Database used

Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number: Beta-178251

Conventional radiocarbon age[1]: 2660±110 BP

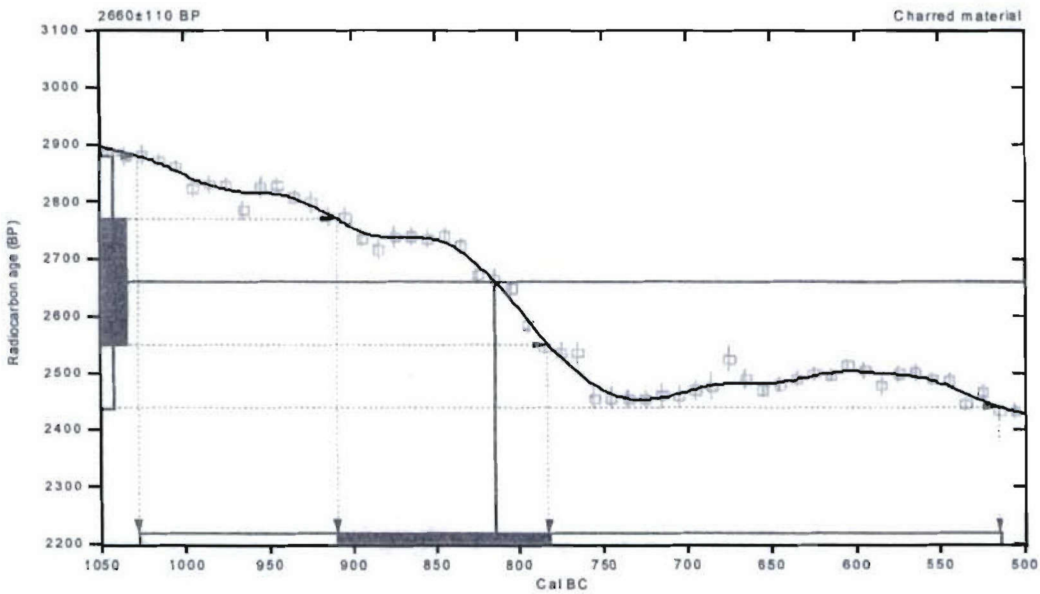
2 Sigma calibrated result: Cal BC 1030 to 520 (Cal BP 2980 to 2460)
(95% probability)

[1] C13/C12 ratio estimated

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 820 (Cal BP 2760)

1 Sigma calibrated result: Cal BC 910 to 780 (Cal BP 2860 to 2730)
(68% probability)



References:

Database used

Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-2:lab. mult=1)

Laboratory number: **Beta-178249**

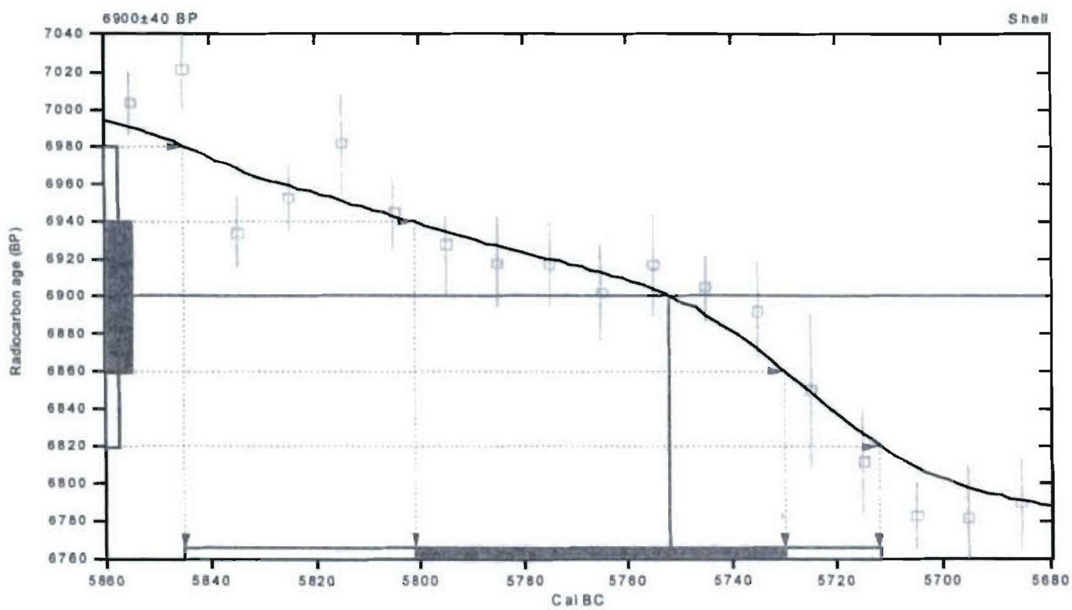
Conventional radiocarbon age: **6900±40 BP**

2 Sigma calibrated result: **Cal BC 5840 to 5710 (Cal BP 7800 to 7660)**
(95% probability)

Intercept data

Intercept of radiocarbon age with calibration curve: Cal BC 5750 (Cal BP 7700)

1 Sigma calibrated result: Cal BC 5800 to 5730 (Cal BP 7750 to 7680)
(68% probability)



References:

Database used

Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: est. C13/C12=-25:lab. mult=1)

Laboratory number: Beta-178245

Conventional radiocarbon age[1]: 580±80 BP

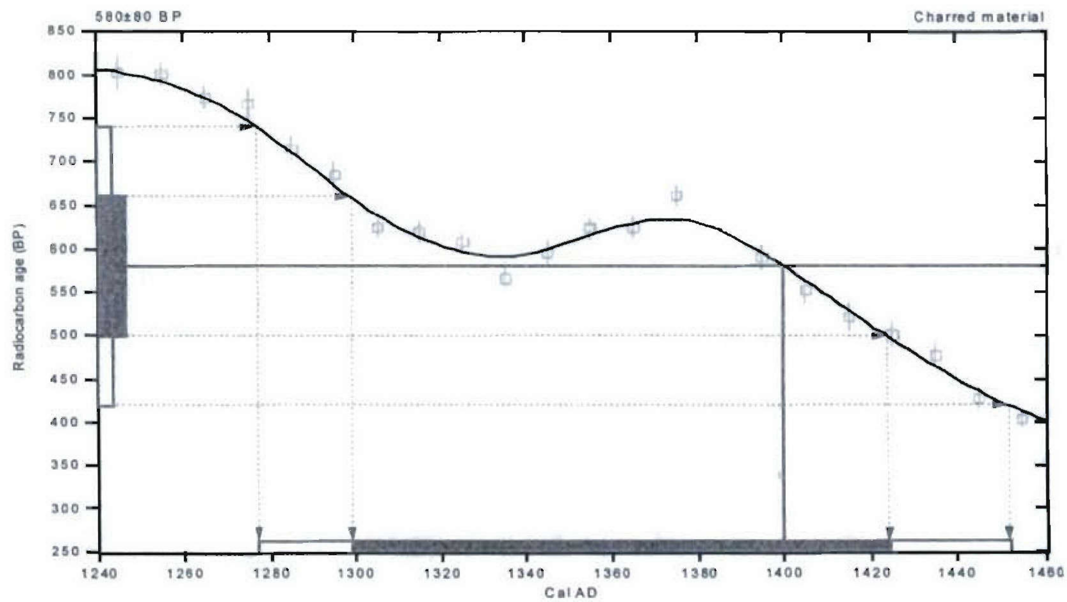
2 Sigma calibrated result: (95% probability) Cal AD 1280 to 1450 (Cal BP 670 to 500)

[1] C13/C12 ratio estimated

Intercept data

Intercept of radiocarbon age with calibration curve: Cal AD 1400 (Cal BP 550)

1 Sigma calibrated result: (68% probability) Cal AD 1300 to 1420 (Cal BP 650 to 530)



References:

Database used

Calibration Database
Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
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A Simplified Approach to Calibrating C14 Dates
Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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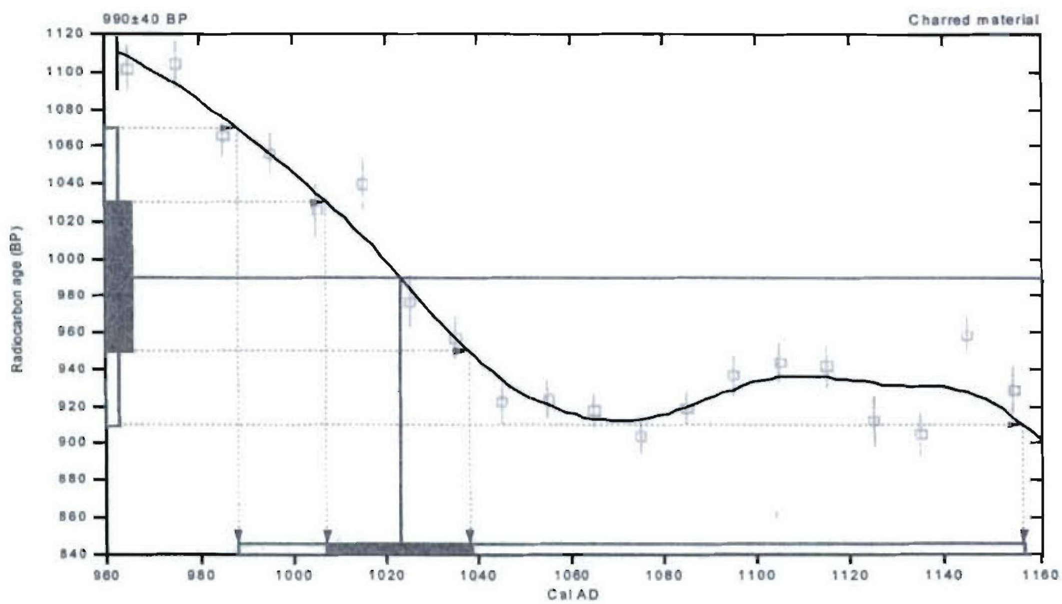
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-12.7:lab. mult=1)

Laboratory number:	**Beta-178246**
Conventional radiocarbon age:	**990±40 BP**
2 Sigma calibrated result: (95% probability)	**Cal AD 990 to 1160 (Cal BP 960 to 790)**

Intercept data

Intercept of radiocarbon age with calibration curve:	Cal AD 1020 (Cal BP 930)
1 Sigma calibrated result: (68% probability)	Cal AD 1010 to 1040 (Cal BP 940 to 910)



References:

Database used

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INTCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-15.5:lab. mult=1)

Laboratory number: **Beta-178248**

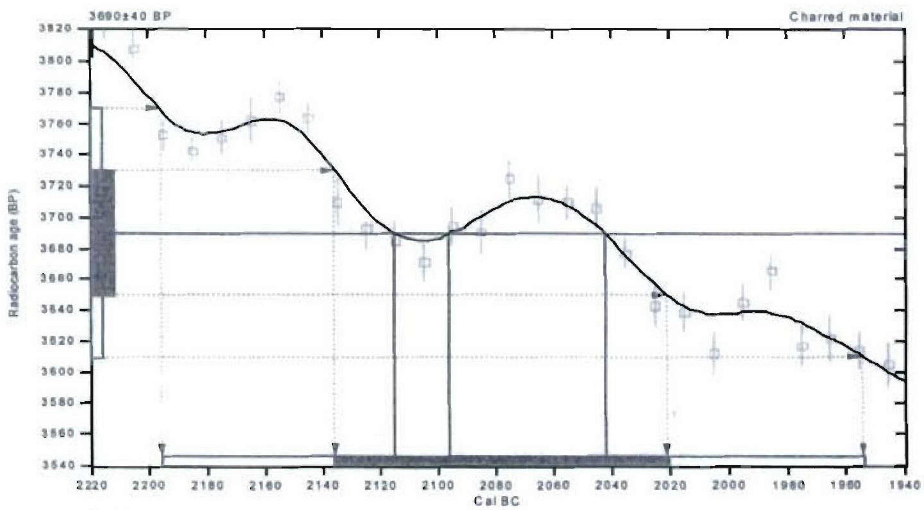
Conventional radiocarbon age: **3690±40 BP**

2 Sigma calibrated result: **Cal BC 2200 to 1950 (Cal BP 4150 to 3900)**
(95% probability)

Intercept data

Intercepts of radiocarbon age
with calibration curve: Cal BC 2120 (Cal BP 4060) and
Cal BC 2100 (Cal BP 4050) and
Cal BC 2040 (Cal BP 3990)

1 Sigma calibrated result: Cal BC 2140 to 2020 (Cal BP 4090 to 3970)
(68% probability)



References:

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Editorial Comment
Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii
INTCAL98 Radiocarbon Age Calibration
Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
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APPENDIX IV

SOIL SAMPLE ANALYSIS

Sample ID and Provenience Key

Sample ID	Area	Provenience	Stratum
1	A	981N878E	III
2	A	990N849E	I
3	A	990N849E	II
4	A	990N849E	III
6	A	990N849E	IV
7	A	990N849E	V
8	A	990N849E	VI
9	C	1042N841E	I
10	C	1042N841E	II
11	C	1042N841E	III
12	D	Test Unit 3	I
13	D	Test Unit 3	II
14	D	Test Unit 3	III
15	D	Test Unit 3	IV
16	D	Test Unit 3	V
17	D	Test Unit 3	VI
18	D	Test Unit 4	III
19	D	Cutbank Profile	I
20	D	Cutbank Profile	II upper
21	D	Cutbank Profile	II lower
22	D	Cutbank Profile	III upper
23	D	Cutbank Profile	III lower

Colorado Analytical Laboratories, Inc.

LABORATORY ANALYSIS REPORT

REPORT TO: MONA CHARLES — LAB NO: 12625

DATE RCVD: 2/4/03

BILL TO: FORT LEWIS COLLEGE
ANTHROPOLOGY DEPT
1000 RIM DRIVE
DURANGO, CO 81301

REPORTED: 2/19/03

PO: VERBAL

PROJECT: SITE 5LA3421 PINON CANYON MANEUVER SITE, LAS ANIMAS CTY

PARAMETER	METHOD REFERENCE	MIN. REPORTING LIMIT	UNITS
CALCIUM CARBONATE EQUIV.	USDA60 6(23c)	0.1	% CaCO3 EQUIV.
HYDROMETER	ASA1 43-5	1	%
pH	ASA2 12-2.6.5	0.1	UNITS
ORGANIC MATTER	ASA2 29-3.5.2	0.1	%
RESISTIVITY	AASHTO T288-91	1	OHM.CM

METHOD REFERENCE

USDA60 = "DIAGNOSIS & IMPROVEMENT OF SALINE & ALKALI SOILS"; USDA HANDBOOK 60 U.S. SALINITY LABORATORY STAFF; 2ND EDITION, 1969; LA RICHARDS

AASHTO = "STANDARD SPECIFICATIONS FOR TRANSPORTATION MATERIALS AND METHODS OF SAMPLING AND TESTING"; 16TH EDITION, 1993; AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS.

ASA1 = "METHODS OF SOIL ANALYSIS, PART 1"; ASA No. 9 AMERICAN SOCIETY of AGRONOMY; 2nd EDITION, 1986; A. KLUTE

ASA2 = "METHODS OF SOIL ANALYSIS, PART 2"; ASA No. 9 AMERICAN SOCIETY of AGRONOMY; 2nd EDITION, 1982; A. L. PAGE

Shane Smith
ANALYSIS SUPERVISED BY

Stacey Nelson
DATA APPROVED FOR RELEASE BY

240 South Main Street / Brighton, Colorado 80601-0507 / 303-659-2313
Mailing Address: P.O. Box 507 / Brighton, Colorado 80601-0507 / Fax: 303-659-2315

Colorado Analytical Laboratories, Inc.

MONA CHARLES
FORT LEWIS COLLEGE
SITE 5LA3421 PINON CANYON MANEUVER SITE, LAS ANIMAS CTY
02/19/03

	HYDROMETER RESULTS			USDA
SAMPLE ID:	SAND (%)	SILT (%)	CLAY (%)	TEXTURE
SAMPLE #1	34	58	8	SILT LOAM
SAMPLE #2	34	50	16	SILT LOAM
SAMPLE #3	31	48	21	LOAM
SAMPLE #4	30	46	24	LOAM
SAMPLE #6	27	42	31	CLAY LOAM
SAMPLE #7	25	44	31	CLAY LOAM
SAMPLE #8	43	49	8	LOAM
SAMPLE #9	20	49	31	CLAY LOAM
SAMPLE #10	13	40	47	SILT CLAY
SAMPLE #11	23	38	39	CLAY LOAM
SAMPLE #12	56	34	10	SANDY LOAM
SAMPLE #13	62	28	10	SANDY LOAM
SAMPLE #14	42	36	22	LOAM
SAMPLE #15	30	39	31	CLAY LOAM
SAMPLE #16	32	39	29	CLAY LOAM
SAMPLE #17	22	47	31	CLAY LOAM
SAMPLE #18	42	31	27	CLAY LOAM
SAMPLE #19	55	35	10	SANDY LOAM
SAMPLE #20	26	39	35	CLAY LOAM
SAMPLE #21	47	22	31	SANDY CLAY LOAM
SAMPLE #22	20	43	37	CLAY LOAM
SAMPLE #23	60	22	18	SANDY LOAM

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MONA CHARLES
FORT LEWIS COLLEGE
SITE 5LA3421 PINON CANYON MANEUVER SITE, LAS ANIMAS CTY
02/19/03

SAMPLE ID:	ORGANIC MATTER (%)	RESISTIVITY (OHM/CM)	pH (UNITS)	LIME (% CaCO3 EQUIV.)
SAMPLE #1	-	342	-	-
SAMPLE #9	-	984	-	-
SAMPLE #10	-	1745	-	-
SAMPLE #11	-	1076	-	-
SAMPLE #12	3.7	-	7.7	3.1
SAMPLE #13	1.6	-	7.9	3.6
SAMPLE #14	1.6	-	7.9	11.9
SAMPLE #15	1.1	-	7.9	12.2
SAMPLE #16	0.9	-	7.9	7.9
SAMPLE #17	0.9	-	8.2	9.2
SAMPLE #18	1.9	-	-	-

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APPENDIX V

POLLEN ANALYSIS

By

John G. Jones, Ph.D.
Palynology Laboratory
Department of Anthropology
Texas A&M University
College Station, TX 77843-4352

Prepared for

Department of Anthropology
Fort Lewis College
Durango, Colorado

A total of nine pollen samples from site 5LA03421 were examined for fossil pollen content. This site is located on the Fort Carson-Pinon Canyon Maneuver Site, in southeastern Colorado. Samples were selected from archaeological features and an environmental profile (see Table 1). It was anticipated that a detailed study of the fossil pollen, if preserved, would offer insights into the regional paleoenvironment and past human activities at the site.

The site area is currently located in a cholla-forb grassland, with scattered small trees. Dominant vegetation includes juniper (*Juniperus*), cholla (*Opuntia imbricata*), prickly pear (*O. polyacantha*), grasses, sagebrush (*Artemisia* spp.), sumac (*Rhus*) and others. The site is a large multi-component occupation with both historic and prehistoric components.

Table 1
Proveniences of the Fort Carson-Pinyon Canyon Maneuver Site Pollen Samples

Sample	Provenience
1	FS#272, Fea. 3, Strat. V
2	FS#264, Cutbank Profile, Strat. III lower
3	FS#243.1, Test Unit 3, Area D, Strat. I
4	FS#243.2, Test Unit 3, Area D, Strat. II
5	FS#243.3, Test Unit 3, Area D, Strat. III
6	FS#243.4, Test Unit 3, Area D, Strat. IV
7	FS#243.5, Test Unit 3, Area D, Strat. V
8	FS#243.6, Test Unit 3, Area D, Strat. VI
9	FS#263, Cutbank Profile, Strat. III upper

Methodology

Fossil pollen preservation from archaeological sites in the southwestern United States is highly variable. Sediments that have remained permanently wet or permanently dry often afford excellent pollen preservation. Exposure to cycles of wetting and drying can lead to rapid deterioration of organic materials, including pollen. These problems are particularly exacerbated in alkaline regions, where high pH values frequently result in a nearly complete loss of fossil pollen grains from buried soils. As a result, it was decided that a conservative extraction technique be employed with the Pinon Canyon sediment samples.

The pollen samples were first quantified (15mls), placed in sterile beakers, and a known quantity of exotic tracer spores was added to each sample. Here, European *Lycopodium* spp. spores were chosen as an exotic, because these spores are unlikely to be found in the actual fossil pollen assemblages from this region. Tracer spores are added to samples for two reasons. First, by adding a known quantity of exotic spores to a known quantity of sediment, fossil pollen concentration values can be calculated. Second, in the event that no fossil pollen is observed in the sediment sample, the presence of *Lycopodium* tracer spores verifies that processor error was not a factor in the pollen loss.

Following the addition of the tracer spores, the samples were washed with concentrated Hydrochloric Acid. This step removed carbonates and dissolved the bonding agent in the tracer spore tablets. The samples were then rinsed in distilled water, sieved through 150-micron mesh screens, and swirled to remove the heavier inorganic particles. Next the samples were consolidated, and 60% Hydrofluoric Acid was added to the residues to remove unwanted silicates. After the silicates had been removed, the residues were rinsed thoroughly, and sonicated in a Delta D-5 sonicator for 30 seconds. This step deflocculated the residues, effectively removing all colloidal material smaller than two microns.

Next, the samples were dehydrated in Glacial Acetic Acid, and were subjected to an acetolysis treatment (Erdtman 1960) consisting of 9 parts Acetic Anhydride to 1 part concentrated Sulfuric Acid. During this process, the samples were placed in a heating block for a period not exceeding 8 minutes. This step removed most unwanted organic materials, including cellulose, hemi-cellulose, lipids and proteins, and converted these materials to water-soluble humates. The samples were then rinsed in distilled water until a neutral pH was achieved.

Following this treatment, the samples were next subjected to a heavy density separation using Zinc Bromide (Sp.G. 2.00). Here, the lighter organic fraction was isolated from the heavier minerals. After this treatment, the lighter pollen and organic remains were collected and washed in 1% KOH to remove any remaining humates. The residues were then dehydrated in absolute alcohol, and transferred to a glycerine medium for curation in glass vials.

Permanent slides for all samples were prepared using glycerine, and identifications were made on a Jenaval compound stereomicroscope at 400-1000x magnification. Identifications were confirmed by using the Palynology Laboratory's extensive pollen reference collection. A total of 200 fossil grains were counted for each sample. This number is considered standard among most palynologists (Barkeley 1934), and is thought to reflect past vegetation fairly well. An expanded count of 400+ grains was made for sample 1, (FS 272) in an attempt to identify additional pollen taxa and potentially important plant species.

Concentration values were calculated for all samples. Hall (1981) and Bryant and Hall (1993) note that concentration values below 1000 to 2,500 grains/ml of sediment may not be well reflective of past conditions. Samples with concentration values lower than these standards may still be valuable for providing a list of vegetation in the region. However, one must remember that the pollen counts obtained probably reflect a differentially preserved assemblage and that the pollen recovered and identified may be quite different that the assemblage that was originally integrated into the sediments at the time of site occupation. As a result, fossil pollen counts with low concentration values should be viewed with caution (Bryant *et al* 1994).

Results

Pollen was present in sufficient quantities to allow for 200-grain counts to be made in all nine of the 5LA03421 sediment samples. A minimum of 31 different taxa was noted in the samples (Table 2), and counts and percentages are

presented in Table 3. Pollen concentration values were variable, but generally high, and values ranged from 1248 to 65,400 fossil grains/ml of sediment.

Most of the pollen taxa encountered in the samples represent taxa that are generally over-represented in southwestern United States samples, including *Pinus (*pine*)*, *Artemisia (*sagebrush*)*, *Juniperus* (juniper), Cheno-Ams (pigweed, goosefoot or shadscale), Poaceae (Grass Family) and Low Spine Asteraceae (ragweed group). These taxa are all produced in abundance, are extremely durable, and due to their distinctive morphology are readily recognizable even when highly degraded.

Additional non-woody taxa noted include *Alternanthera* (strawflower), high spine Asteraceae (sunflower group), Liguliflorae (dandelion-type), *Cirsium* (thistle), Brassicaceae (Mustard Family), Cyperaceae (Sedge Family), *Ephedra* (joint fir), *Eriogonum* (desert buckwheat), Fabaceae (Bean Family), *Platyopuntia* (prickly pear group), Polygonaceae (Knotweed Family), *Sarcobatus*-type (greasewood or pickleweed) and *Typha* (cattail). Other herbaceous types represented in the pollen assemblages include Liliaceae (Lily Family), Malvaceae (Mallow Family), *Sphaeralcea* (globe mallow) and *Yucca* (yucca).

Arboreal taxa represented in the pollen record include *Alnus* (alder), *Picea* (spruce), *Pinus ponderosa*-type (ponderosa pine), *Prunus* (cherry), *Quercus* (oak) and *Salix* (willow). Cultigens were represented by *Zea mays* grains which were found in two of the 5LA03421 sediment samples.

Discussion

Six pollen samples from site 5LA03421 (samples 3 through 8) were collected from a stratigraphic profile and represent what is probably a continuous sedimentary sequence. These data have been presented graphically in Figure 1. Generally, the samples are quite similar throughout the sequence, with assemblages dominated by *Artemisia*, low spine Asteraceae, Cheno-Am, *Juniperus* and *Pinus* pollen. Towards the top of the sequence, in Strats II and I, there is a noticable increase in *Pinus edulis* and *P. ponderosa* type pollen. This is likely due to the generally better preservation in the uppermost samples as reflected by the increased concentration values.

Interestingly, there was a single *Zea mays* pollen grain identified in the sample from Strat II. There was also a slight increase in pollen from Polygonaceae, *Eriogonum* and Brassicaceae, all potentially important economic plants (Moerman 1998, Yanovsky 1936). It is possible that these pollen types reflect the deliberate cultivation or employment of these plants by prehistoric populations in the site area. Other pollen taxa from this stratigraphic sequence represent what are probably normal background pollen taxa.

Two pollen samples (numbers 2 and 9) represent different sections of Strat III collected from an exposed cut bank. Strat III is a thick deposit, and the archaeologists were hoping to find out whether the pollen from this deposit signaled any type of environmental change throughout the sequence.

The pollen assemblages from these two samples are quite similar, and are dominated by durable types, including low spine Asteraceae, *Artemisia*, Cheno-Am, *Juniperus* and *Pinus* pollen grains.

Table 2
Taxa identified in the Ft. Carson-Pinon Canyon Pollen Samples

Taxon	Common Name
Non-Arboreal	
Alternanthera	Alligator Weed, Strawflower
Artemisia	Sagebrush
Asteraceae High Spine	Sunflower Group
Asteraceae Low Spine	Ragweed Group
Liguliflorae	Dandelion, Chicory
Cirsium	Thistle
Brassicaceae	Mustard Family
Cheno-Am	Goosefoot, Pigweed
Cyperaceae	Sedge Family
Ephedra nevadensis-type	Joint Fir, Mormon Tea
Ephedra torreyana-type	Joint Fir, Mormon Tea
Eriogonum	Desert Buckwheat
Fabaceae	Bean, Legume Family
Liliaceae	Lily Family
Malvaceae	Mallow Family
Platyopuntia	Prickly Pear
Poaceae	Grass Family
Polygonaceae	Knotweed Family
Sarcobatus-type	Greasewood. Pickleweed
Sphaeralcea	Globe Mallow
Typha	Cattail
Yucca	Yucca
Zea mays	Maize
Arboreal	
Alnus	Alder
Juniperus	Juniper
Picea	Spruce
Pinus edulis-type	Pinyon Pine Type
Pinus ponderosa-type	Ponderosa Pine Type
Prunus	Cherry
Quercus	Oak
Salix	Willow
Indeterminate	Too Poorly Preserved to Identify

Table 3
Pollen Counts and Percentages in the Ft. Carson-Pinon Canyon Terrace Samples

		Sample		
Taxa	**1**	**2**	**3**	**4**
Alternanthera				3 (1.2)
Artemisia	12 (2.7)	16(7.1)	2 (0.9)	14(5.8)
Asteraceae High Spine	3 (0.7)	4 (1.8)		
Asteraceae Low Spine	34 (7.8)	29 (12.9)	41 (18.8)	35(14.5)
Liguliflorae				
Cirsium				
Brassicaceae		1 (0.4)		1 (0.4)
Cheno-Am	188 (43.0)	98 (43.8)	116 (53.2)	82 (34.0)
Cyperaceae	1 (0.2)		1 (0.5)	
Ephedra nevadensis-type		1 (0.4)		
Ephedra torreyana-type		1 (0.4)		
Eriogonum	4 (0.9)	1 (0.4)	1 (0.5)	8 (3.3)
Fabaceae	2 (0.4)			
Liliaceae				
Malvaceae			1 (0.5)	
Platyopuntia	2 (0.4)		1 (0.5)	
Poaceae	15 (3.4)	11 (4.9)	1 (0.5)	12(5.0)
Polygonaceae	3 (0.7)	2 (0.9)		6 (2.5)
Sarcobatus-type				1 (0.4)
Sphaeralcea				2 (0.8)
Typha	1 (0.2)	1 (0.4)		
Yucca	1 (0.2)			
Zea mays				1 (0.4)
Alnus				1 (0.4)
Juniperus	62 (14.2)	27 (12.1)	15 (6.9)	29 (12.0)
Picea	1 (0.2)			
Pinus edulis-type	93 (21.3)	21 (9.4)	30 (13.8)	37 (15.3)
Pinus ponderosa-type	6 (1.4)	2 (0.9)	5 (2.3)	1 (0.4)
Prunus		1 (0.4)		
Quercus	2 (0.4)	1 (0.4)	2 (0.9)	3 (1.2)
Salix	1 (0.2)			
Indeterminate	6 (1.4)	7 (3.1)	2 (0.9)	5 (2.1)
Total	**437(100)**	**224 (100)**	**218 (100)**	**2 4 1 (100)**
Concentration Value (Grains/ml)	6723	1248	65,400	21,690

Table 3, Contd.
Pollen Counts and Percentages in the Ft. Carson-Pinon Canyon Terrace Samples

	Sample			
Taxa	**5**	**6**	**7**	**8**
Alternanthera				
Artemisia	12 (5.6)	10 (4.5)	6 (2.8)	5 (2.3)
Asteraceae High Spine	1 (0.5)	2 (0.9)		1 (0.5)
Asteraceae Low Spine	35 (16.2)	29 (12.9)	30 (13.8)	34 (15.7)
Liguliflorae				
Cirsium				2 (0.9)
Brassicaceae				
Cheno-Am	119 (55.1)	142 (63.4)	146 (67.3)	137 (63.4)
Cyperaceae				
Ephedra nevadensis-type				
Ephedra torreyana-type		1 (0.4)		
Eriogonum	3 (1.4)		1 (0.5)	2 (0.9)
Fabaceae				
Liliaceae	1 (0.5)			
Malvaceae				
Platyopuntia	1 (0.5)			
Poaceae	7 (3.2)	6 (2.7)	3 (1.4)	9 (4.1)
Polygonaceae	1 (0.5)	2 (0.9)	2 (0.9)	2 (0.9)
Sarcobatus-type		1 (0.4)		
Sphaeralcea		1 (0.4)		
Typha				
Yucca				
Zea mays				
Alnus				
Juniperus	20 (9.3)	14 (6.2)	13 (6.0)	13 (6.0)
Picea				
Pinus edulis-type	11 (5.1)	13 (5.8)	9 (4.1)	8 (3.7)
Pinus ponderosa-type				
Prunus				
Quercus	1 (0.5)	1 (0.4)	4 (1.8)	1 (0.5)
Salix	2 (0.9)	1 (0.4)		1 (0.5)
Indeterminate	2 (0.9)	1 (0.4)	3 (1.4)	1 (0.5)
Total	**216 (100)**	**224 (100)**	**217 (100)**	**216 (100)**
Concentration Value (Grains/ml)	18,514	12,218	13,020	14,954

Table 3, Contd.
Pollen Counts and Percentages in the Pinon Canyon Terrace Samples

	Sample
Taxa	**9**
Alternanthera	
Artemisia	6 (2.7)
Asteraceae High Spine	2 (0.9)
Asteraceae Low Spine	21 (9.4)
Liguliflorae	2 (0.9)
Cirsium	4 (1.8)
Brassicaceae	1 (0.4)
Cheno-Am	107 (48.0)
Cyperaceae	
Ephedra nevadensis-type	1 (0.4)
Ephedra torreyana-type	
Eriogonum	
Fabaceae	
Liliaceae	
Malvaceae	
Platyopuntia	
Poaceae	6 (2.7)
Polygonaceae	
Sarcobatus-type	
Sphaeralcea	
Typha	
Yucca	1 (0.4)
Zea mays	2 (0.9)
Alnus	
Juniperus	22 (9.9)
Picea	
Pinus edulis-type	38 (17.0)
Pinus ponderosa-type	4 (1.8)
Prunus	
Quercus	1 (0.4)
Salix	
Indeterminate	5 (2.2)
Total	**223 (100)**
Concentration Value (Grains/ml)	3552

The concentration values for these two samples are the lowest in any of the samples from this site, suggesting that some degree of differential preservation may have occurred in these deposits. It was surprising to note the occurrence of two *Zea mays* pollen grains in sample 9, from upper portion of Strat III. Rather than indicating the presence of cultivated maize at an early date, these grains

likely signal that sediment mixing, possibly from badger or rodent activity, has occurred. Bioturbation elsewhere at the site has been noted.

A single sample (sediment sample 1) from Feature 5m Strat V was also examined. This sample represents fill from a historic-age dugout. Here, an extended count of 400+ grains was made in an attempt to identify additional plant taxa. As in all of the other samples from 5LA03421, the assemblage was dominated by durable and over-represented pollen grains from low spine Asteraceae, Cheno-Ams, Poaceae, *Juniperus* and *Pinus*. Additional herbaceous taxa noted in this sample include *Artemisia*, high spine Asteraceae, Cyperaceae, *Eriogonum*, Fabaceae, *Platyopuntia*, Polygonaceae, *Typha* and *Yucca*. Arboreal taxa identified in the sample include *Picea*, *Quercus* and *Salix*. All of these plants are known to occur in the area, and their pollen likely reflects natural rather than cultural occurrences.

Summary

A total of 9 pollen samples from site 5LA03421 were examined. It was anticipated that these samples might provide insights into past changes in this site's local vegetation, and offer information on the use of cultigens in this area. All of the samples contained pollen and 200 or 400+ grain counts were obtained for each of the samples. The samples were dominated by durable, abundant and readily recognizable pollen grains including *Artemisia*, low spine Asteraceae, Cheno-Am, Poaceae, *Juniperus* and *Pinus* types. Most other taxa identified in the samples reflect natural background "pollen rain." Cultigen pollen was represented by *Zea mays*, where it was identified in two samples.

An examination of a suite of six pollen samples from a stratigraphically continuous sequence does not show any signs of significant vegetation changes. It is likely that the environmental conditions and plant assemblages in the region have remained fairly consistent over the past several millennia. As bioturbation is a serious problem in some parts of the site, it is possible that the pollen from these sediments has been somewhat homogenized through rodent or badger activities.

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APPENDIX VI
FAUNAL REMAINS

By

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Introduction

Faunal remains recovered from site 5LA3421, located within the Pinon Canyon Maneuver Site (PCMS), Colorado are the subject of this appendix. The remains were retrieved during three field sessions in the summer of 2003 by archeologists from Fort Lewis College (FLC). The site possesses both prehistoric and historic components. This report presents simple descriptive statistics of the samples collected during excavation, and does not focus on specific activities and/or modifications, although these topics will be briefly discussed.

Laboratory Procedures

The faunal remains were assigned field specimen (FS) numbers and corresponding provenience information in the field. The remains were transported to FLC for further investigation and identification at the end of the field season. Before analysis began, the faunal materials were cleaned using dry techniques. Due to the fragility of the remains, bamboo sticks were primarily used to clean any excess dirt that remained on the remains. Any provenience and FS information that could be recorded before analysis began was done in the Access Database. The entire database including the fields and codes is provided at the end of this appendix.

Once analysis began, the faunal collection housed at FLC was used as the comparative collection. Because of the diverse and extensive faunal assemblage collected from 5LA3421, other resources were used to aid in identification of the remains (Gilbert 1973; Olsen 1960, 1964). Due to the similarities in size, features, and physical nature of Bos taurus (cow) to Bos bison (bison) and Ovis aries (sheep) to Capra hircus (goat), identification only occurred to the subfamily level for each. It is most probable, though, that the remains represent cow and sheep. For the remainder of the analysis, they are referred to as the domesticated animals of cow and sheep.

Upon completion of the analysis, the identified elements were quantified using minimum number of individuals (MNI) (Grayson 1984). Number of identified specimens was not utilized because of the criticisms and problems that surround it (Reitz and Wing 1999). Although the elements were only identified to family and subfamily levels, the MNI was still used, employing the methods defined by White (1953).

Results

Site 5LA3421 contained a large and varied faunal assemblage. Table 1 displays the quantity, frequency, and weight in grams of identified and unidentified specimens. The MNI for specimens at the site is represented in Figure 1 as well. It should be noted that the large amount of unidentified bones is due to recovery of smaller remains from the floatation and control samples that were taken during excavation of the site. When the weight is analyzed for identified and unidentified, it is quite apparent that the high

quantity and frequency are due to very small specimens. By weight, the unidentified represents only 16% of the overall population of faunal remains found on the site.

Table 1. 5LA3421 Site Information.

	Quantity	Frequency	Weight/g
Indentified	756	668	3338.5
Unidentified	2663	2657	656.3
Total	3419	3325	3994.8
Percent	100%	100%	100%

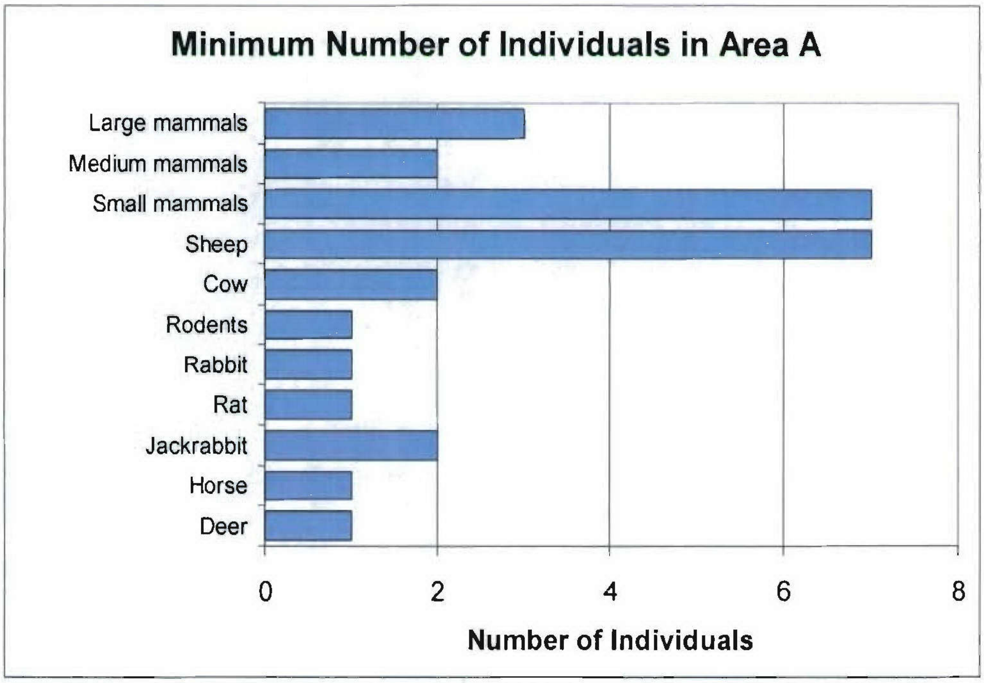

Figure 1. Minimum Number of Individuals represented in the entire site.

Each area of the site is presented in the same manner. The area's sample of identifiable and unidentifiable bone by quantity, frequency and weight is discussed and then a brief discussion concerning other or more specific data. Area A contained the historic features and domestic specimens. Area B did not yield any bone specimens because subsurface testing was not conducted there. Area C was subjected to random sampling of 25 1mx1m units and yielded a very small amount of bone. Area D contained both prehistoric and historic components and yielded faunal remains from the prehistoric component only.

<u>Area A</u>

Area A is an early twentieth century homestead. The faunal specimens from this area are listed in Figure 1. Table 2 displays data in the same format as Table 1, but is

specific to Area A. By weight, Area A contains 99% of the entire site population, but by frequency, Area A contains only 32% of the overall population. This is primarily due to larger number of floatation and control samples processed from other areas of the site.

Table 2. Area A Information.

	Quantity	Frequency	Weight/g
Indentified	727	652	3333.1
Unidentified	406	401	615.2
Total	1133	1053	3948.3
Percent	33%	32%	99%

In Figure 1, it should be noted that domesticated species are represented by 10 individuals. This is important since only 16 individuals are represented on the entire site. The rabbit, jackrabbit, rat, and other rodent specimens could possibly be intrusive. Area A seems to have functioned as a butchering station. The processed meat was either consumed by the site's inhabitants or possibly it was consumed elsewhere off-site. Cuts and cut marks occurred at a higher frequency on the sheep bones within this area.

Other important factors within Area A include the presence of two juvenile sheep and one juvenile cow. One juvenile sheep found within Feature 3 was almost complete. This probably represents February or March site occupation, although this is the only indicator of time of occupation. Area A also contained three infected sheep phalanx. It is not known if the infection displayed on the bone was the cause of death, or was a chronic but livable condition.

Feature 2 in Area A is discussed in detail because, as Table 3 displays, it contains 93% of the specimens from the entire site by weight.

Table 3. Feature 2 Information.

	Quantity	Frequency	Weight/g
Indentified	505	463	3133.8
Unidentified	199	194	572
Total	704	657	3705.8
Percent	21%	20%	93%

A large amount of sheep bone came from within this feature. In addition, 72% of the bones recovered from Feature 2 are within a four-centimeter depth range. This structure was obviously the place chosen for disposal. But, as other evidence suggests, it was a domicile. It is possible that the disposal of bones occurred after the particular structure had been abandoned. Again, cuts and cut marks are evident on many of the domesticated animals.

Area C

Area C, a prehistoric component, yielded five bone fragments. All five were unidentifiable and represent .00076% of the site assemblage recovered (Table 4.). One fragment from this area shows sign of polishing.

Table 4. Area C Information.

	Quantity	Frequency	Weight/g
Indentified	0	0	0
Unidentified	5	5	3.1
Total	5	5	3.1
Percent	0.00%	0.00%	0%

Area D

Faunal remains from Area D were collected from the prehistoric component of this multi-component area. Area D contained .01% of the entire assemblage by weight, but 69% by frequency. This is due to the large amount of minute bone fragments retrieved from control and floatation samples is this area (Table 5). Seven bones display signs of polishing. Numerous fragments from control and floatation samples show signs of burning. Two prehistoric bone beads were found in this area. No domesticates were recovered from this area, and besides some bones being grouped into categories of small and large mammals, only the Order of Rodentia is represented.

Table 5. Area D Information.

	Quantity	Frequency	Weight/g
Indentified	29	16	5.4
Unidentified	2252	2251	38
Total	2281	2267	43.4
Percent	67%	68%	0.01%

Conclusions

The multicomponent site of 5LA3421 has a large faunal assemblage, much of which is represented by historic domesticates. The prehistoric components did not yield any diagnostic taxa, but did generate two prehistoric bone beads. Overall, the bone preservation on the site was good. This allowed for recovery of complete and articulated specimens, especially within Feature 2. It is not yet understood what the meaning of all the bone, especially sheep, is within Feature 2. As discussed in the report, Feature 2 contained a large amount of household items. This along with the impressive foundation are evidence of a domicile. The question as to why so many bones remained in the domicile is an important one. It could be that the structure was abandoned as a living quarter, but had continued use as a storage or butchering building. The other question that is raised is what was being done with the animals. Cut marks and cuts are present on the domesticated species, but was one household responsible for the entire consumption

of these animals. Or, could the site have served as a primary butchering site and the low quality meat bones were discarded, while the higher quality sections were taken to a different location.

One last comparison is between the frequency of bone and the weight in grams of bones. This was calculated for all the MNI's and for the small, medium, and large mammals. In Figure 2 and 3, weight and frequency of the entire sample taken from site 5LA3421 are compared. The domesticated species represent a large amount by weight, but by frequency smaller mammals represent a larger part of the population on the site.

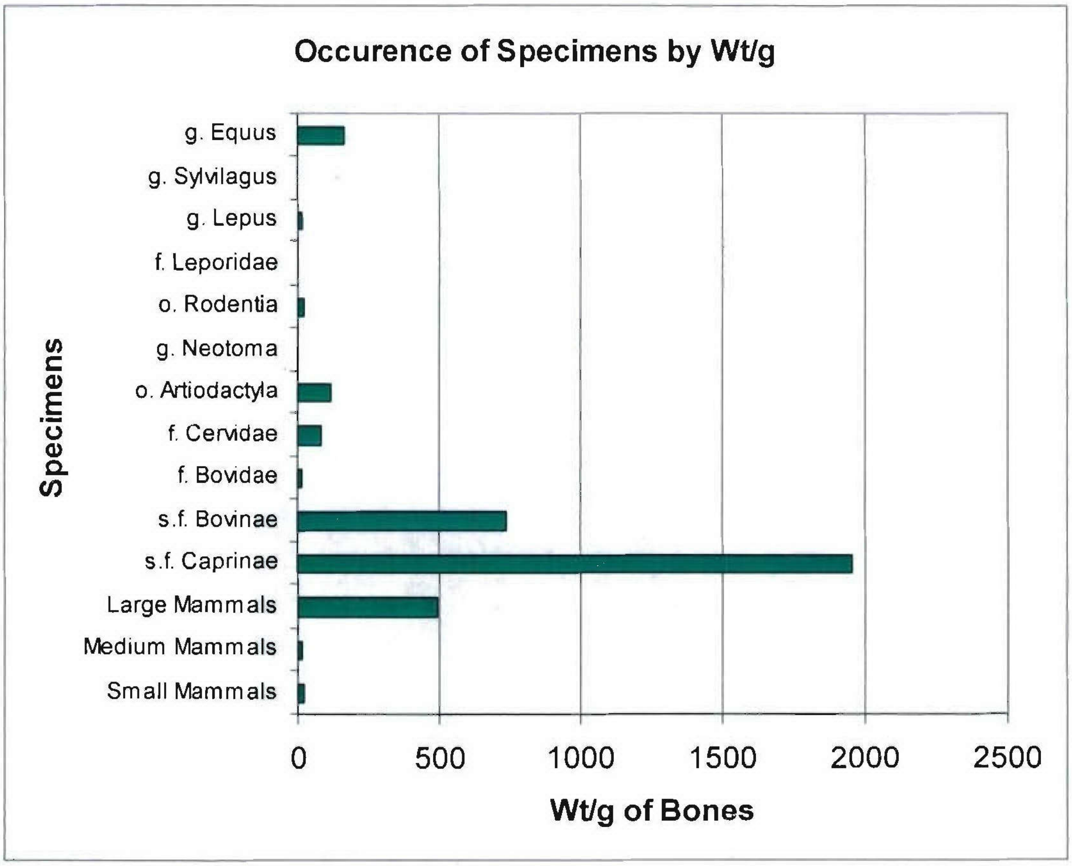

Figure 2. Occurrence of specimens by Wt/g.

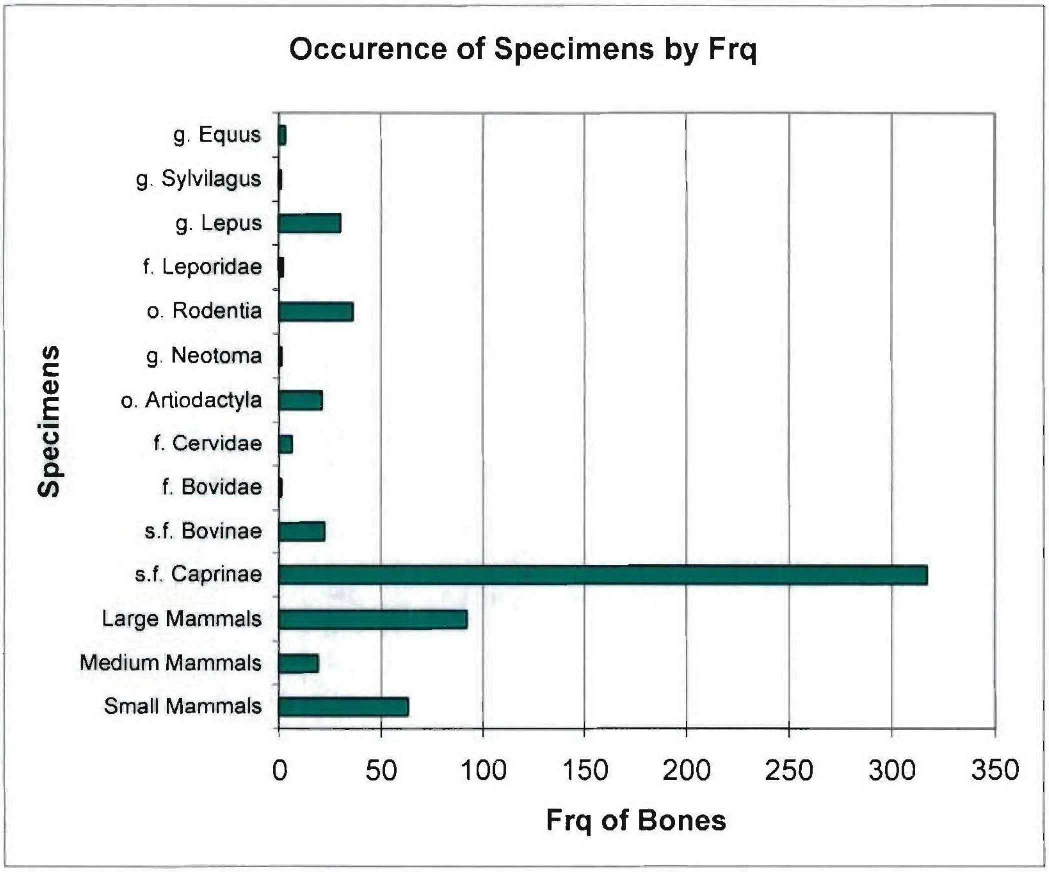

Figure 3. Occurrence of species by Frq.

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Database Codes

Column Names in Database

FS	Field Specimen Number
Sub Fs	Additional Field Specimen Number
Qty	Quantity of Bones
Frq	Frequency of Element
Wt/g	Weight of sample in grams
Code	Condition of Element
Unit	Test Unit Number
Feature	Feature Number
Northing	Unit Northing Coordinate
Easting	Unit Easting Coordinate
Layer	Unit Vertical Layer
Level	Unit Vertical Level
PP V	Vertical Point Provenience Below Site Datum
Control	Control Sample
Float	Float Sample
Corner	Corner in Unit Which Sample Was Taken
Area	Area of Site
Element	Element Name
Side	Side of Element
End	End of Element
Taxon	Scientific Taxonomic Classification of Element
Burn	Whether Element is Burned
Comments	Additional Comments Concerning Element

Codes Contained Within Columns

FS

-Each number represents the actual field specimen number

Sub FS

-In the field, this was recorded as letters. For the database, each letter was assigned a number.

1	A	27	AA	53	BA	79	CA
2	B	28	AB	54	BB	80	CB
3	C	29	AC	55	BC	81	CC
4	D	30	AD	56	BD	82	CD
5	E	31	AE	57	BE	83	CE
6	F	32	AF	58	BF	84	CF
7	G	33	AG	59	BG	85	CG
8	H	34	AH	60	BH	86	CH
9	I	35	AI	61	BI	87	CI
10	J	36	AJ	62	BJ	88	CJ
11	K	37	AK	63	BK	89	CK
12	L	38	AL	64	BL	90	CL
13	M	39	AM	65	BM	91	CM
14	N	40	AN	66	BN	92	CN
15	O	41	AO	67	BO	93	CO
16	P	42	AP	68	BP	94	CP
17	Q	43	AQ	69	BQ	95	CQ
18	R	44	AR	70	BR	96	CR
19	S	45	AS	71	BS	0	No Sub FS
20	T	46	AT	72	BT		
21	U	47	AU	73	BU		
22	V	48	AV	74	BV		
23	W	49	AW	75	BW		
24	X	50	AX	76	BX		
25	Y	51	AY	77	BY		
26	Z	52	AZ	78	BZ		

Qty

-Quantity of bones within the sample

Frq

-Frequency of element within the sample

Wt/g

-Weight in grams of the sample, to the nearest tenth of a gram. When 0 appears, the sample was not large enough to register on the digital scale.

Code

-Item Code that is a standard for Pinon Canyon Maneuver Site faunal analysis.

9	sample was identifiable, fragmentary and/or complete
10	sample was not identifiable, fragmentary

Bones were considered identifiable when the element and taxon could be assigned. When only a general taxonomic grouping could be assigned, the bone was not considered identifiable.

Unit

-Provides the test unit number as assigned in the field

Feature

-Provides the feature number as assigned in the field. Within this column, 4 represents Hearth 1.

Northing

-The northing coordinates of the excavated unit.

Easting

-The easting coordinates of the excavated unit.

Layer

-Each number represents the vertical layer that the sample was taken from within the unit.

Level

-Each number represents the vertical level that the sample was taken from within the unit.

PP V

-When the sample was point provenienced, a precise vertical depth below datum was recorded.

Control

-Some samples came from control samples. Samples that did not come from control samples were recorded as 0, while those that were recovered from control samples were recorded as 1.

Float

-Some samples came from float samples. Samples that did not come from float samples were recorded as 0, while those that were recovered from float samples were recorded as 1.

Corner

-When samples came from either control or float samples, the corner of the unit that the sample was taken from was recorded.

1	NW
2	NE
3	SW
4	SE

Area

-The site was divided into four areas. The area that each sample was recovered from is recorded.

1	A
2	B
3	C
4	D

Element

-Each element that was recovered was assigned a number. Not all elements that are represented within any mammal were recorded. Only those that occurred at the site received a number code.

First Phalanx	1	Metatarsal	17
Second Phalanx	2	Naviculo-Cuboid	18
Third Phalanx	3	Pelvis	19
Astragalus	4	Phalanx/Phalange	20
Atlas	5	Radius	21
Axis	6	Rib	22
Calcaneum	7	Sacrum	23
Disc	8	Scapula	24
Femur	9	Skull/Skull frag	25
Fused second and third tarsal	10	Sternum	26
Humerus	11	Tibia	27
Incisor	12	Tooth	28
Mandible	13	Ulna	29
Maxilla	14	Vertebra	30
Metacarpal	15	Zygomatic Arch	31
Metapodial	16		

Side

-The side which the element represents is recorded. The side could not always be assigned, and when this occurred, a 0 is recorded in the database. In some cases, both sides occurred, and a code was assigned.

1	Right
2	Left
3	Right & Left

End

-The end of the element was also noted. When a 0 appears in this column, and the item code is 9, the bone is complete.

1	Proximal
2	Distal
3	Medial

Taxon

-The taxon that were represented in the population are recorded. When genus level could not be attained, the subfamily, family, order were recorded. When this level could not be definitively decided, the predefined groups of animals were assigned. Small mammals represent those that are smaller than the genus Lepus. Medium mammals are those that are larger than genus Lepus and smaller than genus Canis. Large mammals are representative of animals that are larger than genus Canis. When a 0 occurs in this column, it means that a taxonomic grouping could not be attained.

1	Small Mammals
2	Medium Mammals
3	Large Mammals
4	s.f. Caprinae
5	s.f. Bovinae
6	f. Bovidae
7	f. Cervidae
8	o. Artiodactyla
9	g. Neotoma
10	o. Rodentia
11	f. Leporidae
12	g. Lepus
13	g. Sylvilagus
14	g. Equus

Burn

-Some bones recovered from the site were burned. When this occurred, a 1 was recorded. For bone that showed no signs of being burned, a 0 was recorded in the database.

Comments

-This is the only column that contains text in the entire database. Comments such as cm-cut marks, and c-cut, are recorded in this column. Other comments including signs of infections on bones and age of specimen (juvenile) are also recorded here. Some bones also showed signs of being polished. When the letters n,s,e,w occur, it represent north, south, east and west. These letters are followed by the fraction ½, this means that the sample was taken from either the north(n), south(s), east(e) or west(w) half of the unit.

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
5	0	2	2	0	10	0	2	981	852	1	1	0	1	0	1	1	0	0	0	0	0	
5	0	1	1	0.6	9	0	2	981	852	1	1	0	0	0	0	1	30	0	0	1	0	
7	0	2	1	0.1	10	0	2	984	852	1	1	0	1	0	3	1	0	0	0	0	0	
11	0	3	1	1.3	9	0	2	981	852	2	1	0	0	0	0	1	22	0	0	3	0	
11	0	1	1	0.3	9	0	2	981	852	2	1	0	0	0	0	1	27	2	2	1	0	
11	0	1	1	2.5	9	0	2	981	852	2	1	0	0	0	0	1	29	0	1	3	0	cm
11	0	1	1	0.2	9	0	2	981	852	2	1	0	0	0	0	1	22	0	1	1	0	
11	0	1	1	1.4	9	0	2	981	852	2	1	0	0	0	0	1	30	0	0	3	0	
11	0	5	2	0.7	9	0	2	981	852	2	1	0	1	0	2	1	9	3	1	10	0	
11	0	2	1	0.6	9	0	2	981	852	2	1	0	0	0	0	1	25	0	0	10	0	
11	0	2	1	4.4	9	0	2	981	852	2	1	0	0	0	0	1	28	0	0	3	0	
11	1	1	1	4.5	10	0	2	980.7219	853.4879	2	1	97.419	0	0	0	1	0	0	0	3	0	
11	5	1	1	1.4	9	0	2	979.3667	853.8205	2	1	97.368	0	0	0	1	10	2	0	8	0	juvenile
11	5	1	1	1.8	9	0	2	979.3667	853.8205	2	1	97.368	0	0	0	1	17	2	0	8	0	juvenile
11	5	1	1	2.6	9	0	2	979.3667	853.8205	2	1	97.368	0	0	0	1	4	2	0	8	0	juvenile
11	5	2	1	13.2	9	0	2	979.3667	853.8205	2	1	97.368	0	0	0	1	27	2	0	8	0	juvenile
11	0	6	6	1.6	10	0	2	981	852	2	1	0	0	0	0	1	0	0	0	0	0	
11	0	1	1	2.7	9	0	2	981	852	2	1	0	0	0	0	1	1	0	0	8	0	
12	0	1	1	0.5	10	0	0	979	846	2	1	0	0	0	0	1	0	0	0	0	0	
15	0	3	3	3.4	9	0	2	981	852	3	1	0	0	0	0	1	16	0	0	3	0	
15	78	4	3	91.8	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	27	0	0	4	0	juvenile (2)
15	0	1	1	8.7	9	0	2	981	852	3	1	0	0	0	0	1	4	2	0	4	0	
15	0	4	3	10.9	9	0	2	981	852	3	1	0	0	0	0	1	19	0	0	3	0	
15	0	8	7	4.6	9	0	2	981	852	3	1	0	0	0	0	1	27	0	0	1	0	
15	0	6	6	1.4	9	0	2	981	852	3	1	0	0	0	0	1	30	0	0	1	0	cm
15	0	2	2	10	9	0	2	981	852	3	1	0	1	0	1	1	30	0	0	8	0	
15	0	1	1	10.2	9	0	2	981	852	3	1	0	1	0	1	1	27	2	1	4	0	cut
15	0	2	1	29.4	9	0	2	981	852	3	1	0	1	0	1	1	1	0	0	5	0	
15	0	1	1	30.1	9	0	2	981	852	3	1	0	1	0	1	1	9	1	2	4	0	
15	0	1	1	21.8	9	0	2	981	852	3	1	0	1	0	1	1	15	1	0	4	0	
15	0	5	5	3.9	9	0	2	981	852	3	1	0	0	0	0	1	19	0	0	10	0	
15	0	2	2	0.5	9	0	2	981	852	3	1	0	0	0	0	1	24	0	1	1	0	
15	0	1	1	0.1	9	0	2	981	852	3	1	0	0	0	0	1	9	0	2	1	0	
15	0	1	1	1.3	9	0	2	981	852	3	1	0	0	0	0	1	9	2	3	1	0	
15	0	6	6	3.3	9	0	2	981	852	3	1	0	0	0	0	1	11	0	0	1	0	
15	0	4	4	0.7	9	0	2	981	852	3	1	0	0	0	0	1	11	0	0	10	0	

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
15	0	1	1	16.2	9	0	2	981	852	3	1	0	0	0	0	1	24	2	1	4	0	cm
15	78	2	2	20.5	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	9	3	0	4	0	
15	78	3	2	37.4	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	17	0	0	4	0	juvenile (1)
15	0	100	100	104.3	10	0	2	981	852	3	1	0	0	0	0	1	0	0	0	0	0	
15	0	3	3	26	9	0	2	981	852	3	1	0	0	0	0	1	30	0	0	0	0	cm
15	0	1	1	1.4	9	0	2	981	852	3	1	0	1	0	1	1	3	0	0	4	0	infection
15	0	1	1	3.5	9	0	2	981	852	3	1	0	0	0	0	1	26	0	3	3	0	
15	0	1	1	0.6	9	0	2	981	852	3	1	0	0	0	0	1	9	1	1	12	0	
15	0	2	2	1	9	0	2	981	852	3	1	0	0	0	0	1	20	0	0	3	0	
15	0	1	1	0	9	0	2	981	852	3	1	0	0	0	0	1	1	0	0	1	0	
15	0	2	2	2.5	9	0	2	981	852	3	1	0	0	0	0	1	1	0	1	4	0	
15	0	1	1	9.4	9	0	2	981	852	3	1	0	0	0	0	1	7	2	0	4	0	
15	0	3	3	6	9	0	2	981	852	3	1	0	0	0	0	1	2	0	0	4	0	
15	0	3	3	0.8	9	0	2	981	852	3	1	0	0	0	0	1	22	0	0	2	0	
15	0	1	1	0.1	10	0	2	981	852	3	1	0	1	0	2	1	0	0	0	0	0	
15	0	21	21	32.4	9	0	2	981	852	3	1	0	0	0	0	1	22	0	0	3	0	
15	78	2	2	35.1	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	21	1	0	4	0	cut
15	0	1	1	51.5	9	0	2	981	852	3	1	0	0	0	0	1	30	0	0	5	0	cm, cervical
15	0	1	1	16.7	9	0	2	981	852	3	1	0	0	0	0	1	6	0	0	4	0	
15	0	1	1	3.3	9	0	2	981	852	3	1	0	0	0	0	1	1	0	0	4	0	
15	0	4	4	6.3	9	0	2	981	852	3	1	0	0	0	0	1	3	0	0	4	0	
15	0	4	4	0.9	9	0	2	981	852	3	1	0	0	0	0	1	29	0	0	1	0	
15	0	5	5	3.6	9	0	2	981	852	3	1	0	0	0	0	1	29	0	0	2	0	
15	0	1	1	7.2	9	0	2	981	852	3	1	0	0	0	0	1	29	1	1	4	0	
15	0	1	1	23	9	0	2	981	852	3	1	0	0	0	0	1	11	2	2	4	0	
15	0	1	1	0.8	9	0	2	981	852	3	1	0	0	0	0	1	24	0	3	3	0	
15	0	2	2	0.3	9	0	2	981	852	3	1	0	0	0	0	1	22	0	0	1	0	
15	11	1	1	10.4	10	0	2	980.94	853.25	3	1	97.39	0	0	0	1	0	0	0	3	0	
15	78	4	2	9.6	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	1	0	0	4	0	
15	20	1	1	7.2	9	0	2	979.66	852.35	3	1	97.35	0	0	0	1	15	0	0	4	0	juvenile
15	19	1	1	1.4	9	0	2	979.83	853.9	3	1	97.33	0	0	0	1	30	0	0	12	0	
15	18	5	5	59.1	9	0	2	980.49	853.15	3	1	97.36	0	0	0	1	30	0	0	4	0	cut, cervical
15	17	1	1	24.9	9	0	2	980.74	853.24	3	1	97.35	0	0	0	1	29	1	2	4	0	cm
15	16	1	1	27.5	9	0	2	980.68	853.27	3	1	97.35	0	0	0	1	17	0	0	5	0	juvenile
15	15	3	1	89.3	9	0	2	980.47	852.72	3	1	97.35	0	0	0	1	27	2	1	5	0	cut
15	14	1	1	8.7	9	0	2	980.87	853.54	3	1	97.36	0	0	0	1	22	0	0	3	0	cut

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
15	13	1	1	3.5	9	0	2	980.57	853.54	3	1	97.37	0	0	0	1	22	0	0	3	0	
15	22	1	1	15.6	10	0	2	979.52	852.25	3	1	97.36	0	0	0	1	0	0	0	3	0	cut
15	11	1	1	7.4	9	0	2	980.94	853.25	3	1	97.39	0	0	0	1	30	0	0	5	0	cut
15	25	1	1	14.4	9	0	2	980.92	853.44	3	1	97.36	0	0	0	1	17	0	1	7	0	
15	10	1	1	11.4	10	0	2	980.91	853.23	3	1	97.38	0	0	0	1	0	0	0	3	0	
15	9	1	1	11.3	9	0	2	980.02	852.26	3	1	97.39	0	0	0	1	18	0	0	5	0	cm
15	7	2	1	4.9	9	0	2	980.44	852.56	3	1	97.36	0	0	0	1	22	0	3	0	0	cm (possbile rodent knawing)
15	4	1	1	18.7	9	0	2	980.02	852.23	3	1	97.37	0	0	0	1	16	0	3	4	0	
15	95	1	1	1.9	9	0	2	980.32	853.28	3	1	97.28	0	0	0	1	22	0	1	3	0	
15	94	1	1	23.2	9	0	2	980.43	853.97	3	1	97.36	0	0	0	1	9	2	1	4	0	
15	93	1	1	3	9	0	2	980.57	853.96	3	1	97.34	0	0	0	1	16	0	0	4	0	juvenile
15	92	5	1	2.5	9	0	2	980.56	853.49	3	1	97.3	0	0	0	1	25	0	0	9	0	
15	91	1	1	11.8	9	0	2	980.8	852.84	3	1	97.29	0	0	0	1	19	1	3	4	0	cut
15	12	4	1	7.3	10	0	2	980.57	853.54	3	1	97.35	0	0	0	1	0	0	0	0	0	
15	78	5	5	17.3	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	22	0	0	3	0	
15	3	2	2	4.6	9	0	2	979.65	852.39	3	1	97.37	0	0	0	1	2	3	0	4	0	
15	81	1	1	15.7	9	0	2	979.64	852.6	3	1	97.32	0	0	0	1	27	2	2	8	0	cut
15	81	1	1	9.4	9	0	2	979.64	852.6	3	1	97.32	0	0	0	1	30	0	0	8	0	
15	83	1	1	6.4	9	0	2	980	853.55	3	1	97.31	0	0	0	1	27	2	1	4	0	
15	84	2	2	20	9	0	2	979.83	853.75	3	1	97.3	0	0	0	1	30	0	0	4	0	
15	85	1	1	17.8	9	0	2	979.84	853.7	3	1	97.29	0	0	0	1	31	2	0	5	0	
15	0	1	1	5.9	9	0	2	981	852	3	1	0	0	0	0	1	3	0	0	8	0	
15	86	1	1	11.8	9	0	2	979.96	854	3	1	97.31	0	0	0	1	27	2	2	4	0	
15	86	1	1	6.6	9	0	2	979.96	854	3	1	97.31	0	0	0	1	4	2	0	4	0	
15	21	1	1	11.8	9	0	2	980.57	853.78	3	1	97.33	0	0	0	1	5	0	0	4	0	
15	0	6	6	33.8	9	0	2	981	852	3	1	0	0	0	0	1	25	0	0	3	0	
15	90	1	1	12.2	9	0	2	981	853.33	3	1	97.37	0	0	0	1	19	1	3	4	0	
15	0	8	8	2.7	9	0	2	981	852	3	1	0	0	0	0	1	21	0	0	10	0	
15	17	1	1	24.9	9	0	2	980.74	853.24	3	1	97.35	0	0	0	1	21	1	2	4	0	cm
15	86	1	1	3.9	9	0	2	979.96	854	3	1	97.31	0	0	0	1	18	2	0	4	0	
15	86	1	1	18.4	9	0	2	979.96	854	3	1	97.31	0	0	0	1	17	0	2	4	0	cm
15	89	1	1	62.8	10	0	2	979.67	852.62	3	1	97.3	0	0	0	1	0	0	0	3	0	cm
15	26	3	1	6.6	9	0	2	980.96	853.98	3	1	97.36	0	0	0	1	17	2	2	0	0	juvenile
15	26	4	2	1.1	9	0	2	980.96	853.98	3	1	97.36	0	0	0	1	2	2	0	8	0	juvenile
15	26	4	2	2.5	9	0	2	980.96	853.98	3	1	97.36	0	0	0	1	1	2	0	8	0	juvenile

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
15	26	3	1	11.5	9	0	2	980.96	853.98	3	1	97.36	0	0	0	1	11	2	0	8	0	juvenile
15	78	2	2	23.2	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	24	3	0	4	0	cut
15	78	1	1	27.1	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	13	1	2	4	0	
15	70	1	1	162	9	0	2	980.55	852.6	3	1	97.35	0	0	0	1	15	1	0	5	0	
15	69	1	1	37.8	9	0	2	979.57	852.38	3	1	97.34	0	0	0	1	3	0	0	14	0	
15	68	1	1	24.4	9	0	2	979.47	852.35	3	1	97.35	0	0	0	1	17	2	0	4	0	
15	0	21	21	12	9	0	2	981	852	3	1	0	0	0	0	1	25	0	0	1	0	
15	78	1	1	20.7	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	2	0	0	5	0	
15	0	2	2	6.7	9	0	2	981	852	3	1	0	1	0	1	1	1	0	0	4	0	infection (1)
15	78	1	1	15	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	1	0	0	5	0	juvenile
15	78	1	1	7.1	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	29	1	1	7	0	
15	78	1	1	15	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	11	2	2	4	0	cut
15	78	1	1	5.5	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	3	0	0	5	0	juvenile
15	78	19	19	135.2	10	0	2	979.65	853.45	3	1	97.33	0	0	0	1	0	0	0	0	0	
15	60	1	1	2.8	10	0	2	979.89	853.47	3	1	97.35	0	0	0	1	0	0	0	0	0	
15	78	1	1	3.6	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	19	0	2	3	0	
15	73	1	1	17.6	9	0	2	979.81	853.77	3	1	97.3	0	0	0	1	5	0	0	4	0	
15	78	1	1	18.3	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	25	0	0	5	0	
15	78	2	2	43.1	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	19	1	0	4	0	cm
15	67	1	1	15.7	9	0	2	980.81	852.81	3	1	97.34	0	0	0	1	11	2	1	4	0	cut
15	66	1	1	43.6	9	0	2	979.44	852.19	3	1	97.35	0	0	0	1	21	1	2	5	0	
15	64	1	1	47.4	9	0	2	980.75	852.97	3	1	97.31	0	0	0	1	11	2	0	4	0	cm
15	62	3	1	35.6	9	0	2	980.03	852.7	3	1	97.35	0	0	0	1	11	2	1	4	0	cut
15	61	1	1	21.8	9	0	2	980.13	853.92	3	1	97.33	0	0	0	1	15	2	0	4	0	
15	61	1	1	0.5	9	0	2	980.13	853.92	3	1	97.33	0	0	0	1	8	0	0	3	0	
15	61	1	1	0.5	10	0	2	980.13	853.92	3	1	97.33	0	0	0	1	0	0	0	0	0	
15	61	1	1	5.2	9	0	2	980.13	853.92	3	1	97.33	0	0	0	1	22	0	0	3	0	
15	60	1	1	4.1	9	0	2	979.89	853.47	3	1	97.35	0	0	0	1	24	1	3	8	0	cut
15	78	1	1	9	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	4	0	0	4	0	
15	76	1	1	4.2	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	9	1	1	12	0	
15	78	2	2	56.6	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	11	1	0	7	0	cut
15	77	1	1	34.3	9	0	2	980.2	853.2	3	1	97.35	0	0	0	1	1	0	0	5	0	
15	77	2	2	137.2	10	0	2	980.2	853.2	3	1	97.35	0	0	0	1	0	0	0	3	0	
15	77	1	1	31.7	9	0	2	980.2	853.2	3	1	97.35	0	0	0	1	14	0	0	5	0	
15	76	15	15	14.5	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	25	0	0	10	0	
15	76	14	14	0.5	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	20	0	0	1	0	

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
15	76	1	1	40.4	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	16	0	2	5	0	
15	76	2	2	16.1	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	4	0	0	4	0	
15	76	1	1	17.8	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	1	0	0	5	0	
15	76	2	2	46.2	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	27	2	2	4	0	
15	76	4	4	2.1	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	21	1	2	4	0	
15	72	1	1	36.2	9	0	2	980.6	852.98	3	1	97.32	0	0	0	1	19	2	0	4	0	
15	76	1	1	12.5	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	27	0	0	4	0	juvenile
15	73	1	1	47.8	9	0	2	979.81	853.77	3	1	97.3	0	0	0	1	11	1	0	4	0	cm
15	76	1	1	9	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	7	0	0	4	0	
15	76	13	13	84.5	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	30	0	0	4	0	cm, cut
15	76	13	13	58	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	22	0	0	3	0	cm, cut
15	76	1	1	4.5	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	18	1	0	4	0	cm
15	76	1	1	18.6	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	24	1	1	4	0	
15	2	1	1	10.8	9	0	2	980.47	853.58	3	1	97.3	0	0	0	1	23	0	0	3	0	
15	2	1	1	14.2	10	0	2	980.47	853.58	3	1	97.3	0	0	0	1	0	0	0	0	0	
15	2	1	1	0.8	9	0	2	980.47	853.58	3	1	97.3	0	0	0	1	27	1	2	13	0	
15	2	1	1	25	9	0	2	980.47	853.58	3	1	97.3	0	0	0	1	27	1	2	5	0	
15	2	1	1	15.2	9	0	2	980.47	853.58	3	1	97.3	0	0	0	1	30	0	0	4	0	
15	73	1	1	10.3	9	0	2	979.81	853.77	3	1	97.3	0	0	0	1	24	2	3	4	0	cut
15	18	1	1	38.5	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	30	0	0	4	0	cut
15	76	1	1	73.2	9	0	2	980.3	853.3	3	1	97.3	0	0	0	1	1	0	0	14	0	
15	52	1	1	0.9	9	0	2	980.5	853.21	3	1	97.33	0	0	0	1	27	2	2	12	0	
15	51	1	1	3.4	9	0	2	980.28	853.61	3	1	97.33	0	0	0	1	26	0	0	4	0	
15	38	1	1	1	9	0	2	980.57	852.77	3	1	97.36	0	0	0	1	19	1	0	1	0	
15	37	1	1	1.1	9	0	2	980.46	852.37	3	1	97.36	0	0	0	1	22	0	0	3	0	
15	33	1	1	7.5	9	0	2	980.3	853.5	3	1	97.35	0	0	0	1	22	0	0	3	0	cm
15	36	2	2	1.6	9	0	2	979.67	852.96	3	1	97.36	0	0	0	1	22	0	0	3	0	
15	34	1	1	4.5	9	0	2	980.11	853.57	3	1	97.35	0	0	0	1	22	0	3	3	0	cut
15	0	6	6	5.6	9	0	2	981	852	3	1	0	0	0	0	1	30	0	0	2	0	
15	0	16	16	41.4	10	0	2	981	852	3	1	0	1	0	1	1	0	0	0	0	0	
15	0	3	3	0.2	9	0	2	981	852	3	1	0	1	0	1	1	16	0	0	12	0	
15	0	1	1	6.8	9	0	2	981	852	3	1	0	1	0	1	1	29	2	1	4	0	
15	1	1	1	22	9	0	2	979.4917	853.6234	3	1	97.35	0	0	0	1	27	2	1	8	0	
15	52	4	4	1.2	9	0	2	980.5	853.21	3	1	97.33	0	0	0	1	30	0	0	12	0	
15	27	1	1	2.9	9	0	2	980.57	853.47	3	1	97.35	0	0	0	1	26	0	0	4	0	
15	0	1	1	6.5	9	0	2	981	822	3	1	0	1	0	1	1	4	0	0	4	0	

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
15	45	1	1	3.6	9	0	2	980.28	853.56	3	1	97.33	0	0	0	1	26	0	0	8	0	
15	46	1	1	3.1	10	0	2	980.47	853.77	3	1	97.34	0	0	0	1	0	0	0	3	0	
15	47	3	2	22.6	9	0	2	980.78	853.46	3	1	97.33	0	0	0	1	30	0	0	4	0	cut
15	49	1	1	6.8	9	0	2	980.47	853.38	3	1	97.35	0	0	0	1	30	0	0	4	0	cervical
15	50	1	1	5.1	9	0	2	980.34	853.63	3	1	97.33	0	0	0	1	22	0	1	3	0	
15	52	11	11	1.2	9	0	2	980.5	853.21	3	1	97.33	0	0	0	1	20	0	0	12	0	
15	0	2	2	4.1	9	0	2	981	852	3	1	0	1	0	1	1	2	0	0	4	0	infection (1)
15	52	17	17	2.7	10	0	2	980.5	853.21	3	1	97.33	0	0	0	1	0	0	0	0	0	
15	52	1	1	1	9	0	2	980.5	853.21	3	1	97.33	0	0	0	1	7	0	0	12	0	
15	52	4	4	2.2	9	0	2	980.5	853.21	3	1	97.33	0	0	0	1	16	0	0	12	0	
15	0	2	2	3.9	9	0	2	981	852	3	1	0	1	0	1	1	22	0	0	3	0	
15	53	1	1	5.4	9	0	2	980.6	853.2	3	1	97.36	0	0	0	1	22	0	1	3	0	
15	59	1	1	1.6	9	0	2	979.94	953.82	3	1	97.35	0	0	0	1	23	0	1	11	0	
15	58	3	3	3.1	9	0	2	979.95	853.91	3	1	97.32	0	0	0	1	30	0	0	12	0	
15	58	1	1	0.6	9	0	2	979.95	853.91	3	1	97.32	0	0	0	1	22	0	0	2	0	
15	58	1	1	7.7	9	0	2	979.95	853.91	3	1	97.32	0	0	0	1	7	0	0	4	0	
15	58	1	1	3.7	9	0	2	979.95	853.91	3	1	97.32	0	0	0	1	9	0	2	8	0	
15	58	1	1	3.1	10	0	2	979.95	853.91	3	1	97.32	0	0	0	1	0	0	0	3	0	
15	57	3	3	19.7	9	0	2	980.48	853.95	3	1	97.34	0	0	0	1	30	0	0	4	0	cm
15	39	1	1	2.1	10	0	2	980.17	852.54	3	1	97.37	0	0	0	1	0	0	0	2	0	
15	56	1	1	12	9	0	2	980.92	853.54	3	1	97.35	0	0	0	1	3	0	0	5	0	
15	28	1	1	44.6	9	0	2	980.72	852.68	3	1	97.345	0	0	0	1	13	2	0	4	0	
15	2	1	1	62.5	9	0	2	980.6289	853.3817	3	1	97.35	0	0	0	1	9	2	0	4	0	
15	40	1	1	3.2	9	0	2	980.49	852.85	3	1	97.35	0	0	0	1	22	0	0	3	0	
15	44	1	1	8.3	9	0	2	980.2	853.8	3	1	97.34	0	0	0	1	25	0	0	3	0	
15	42	2	2	11.1	9	0	2	979.57	852.62	3	1	97.33	0	0	0	1	22	0	1	3	0	cm
15	41	2	2	7.8	9	0	2	979.62	852.4	3	1	97.34	0	0	0	1	1	3	0	4	0	
15	40	1	1	50.7	9	0	2	980.49	852.85	3	1	97.35	0	0	0	1	21	1	2	14	0	
15	30	1	1	23.3	9	0	2	979.43	853.74	3	1	97.35	0	0	0	1	1	0	0	5	0	
15	59	1	1	1.2	9	0	2	979.94	853.82	3	1	97.35	0	0	0	1	30	0	0	11	0	
15	32	1	1	11.9	9	0	2	980.42	853.75	3	1	97.35	0	0	0	1	30	0	0	4	0	cm
15	78	1	1	1.8	9	0	2	979.65	853.45	3	1	97.33	0	0	0	1	19	2	0	10	0	
15	29	1	1	5.4	9	0	2	980.7	853.37	3	1	97.35	0	0	0	1	24	1	0	8	0	
16	1	2	1	16.1	9	0	2	982.9193	852.4803	2	2	97.431	0	0	0	1	9	2	1	6	0	cm
16	0	2	2	3	9	0	2	984	852	2	2	0	1	0	3	1	22	0	0	2	0	
19	0	1	1	0.3	9	0	0	979	846	2	2	0	0	0	0	1	21	0	1	1	0	s 1/2

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
19	0	2	2	0.6	10	0	0	979	846	2	2	0	0	0	0	1	0	0	0	0	0	s 1/2
19	0	1	1	0.1	9	0	0	979	846	2	2	0	0	0	0	1	27	0	2	1	0	s 1/2
25	2	1	1	28.6	9	0	0	983.75	853.75	2	3	97.3	0	0	0	1	29	1	2	4	0	
25	2	1	1	28.6	9	0	0	983.75	853.75	2	3	97.3	0	0	0	1	21	1	2	4	0	
25	1	7	1	15.4	9	0	0	983.75	853.65	2	3	97.29	0	0	0	1	21	1	1	4	0	
26	10	1	1	2.1	9	0	2	982.7	853.4	3	1	97.38	0	0	0	1	22	0	0	3	0	
26	12	1	1	17.2	9	0	2	982.1	853.25	3	1	97.39	0	0	0	1	2	0	0	5	0	
26	0	1	1	0.3	9	0	2	984	852	3	1	0	0	0	0	1	22	0	1	2	0	
26	10	1	1	23.9	9	0	2	982.7	853.4	3	1	97.38	0	0	0	1	17	1	0	4	0	
26	10	1	1	4.2	9	0	2	982.7	853.4	3	1	97.38	0	0	0	1	18	0	0	4	0	
26	10	1	1	2.9	9	0	2	982.7	853.4	3	1	97.38	0	0	0	1	21	2	2	4	0	
26	10	1	1	24.5	9	0	2	982.7	853.4	3	1	97.38	0	0	0	1	15	1	0	4	0	
26	10	3	3	10	9	0	2	982.7	853.4	3	1	97.38	0	0	0	1	1	0	0	4	0	
26	9	3	3	16.8	9	0	2	982.43	853.02	3	1	97.37	0	0	0	1	30	0	0	4	0	cut
26	6	1	1	1.2	9	0	2	982.15	853.48	3	1	97.37	0	0	0	1	16	0	0	1	0	
26	5	1	1	3.3	9	0	2	982.95	852.05	3	1	97.36	0	0	0	1	22	0	0	3	0	
26	4	1	1	1.8	9	0	2	983	852.21	3	1	97.37	0	0	0	1	22	0	0	3	0	cm
26	2	2	1	0.4	10	0	2	982	853.14	3	1	97.4	0	0	0	1	0	0	0	0	0	
26	0	1	1	2.6	9	0	2	984	852	3	1	0	0	0	0	1	22	0	0	3	0	cm
26	0	1	1	1.1	9	0	2	984	852	3	1	0	0	0	0	1	3	0	0	7	0	
26	0	6	6	5.7	10	0	2	984	852	3	1	0	0	0	0	1	0	0	0	0	0	cm
26	0	1	1	3.4	9	0	2	984	852	3	1	0	0	0	0	1	1	0	0	7	0	
26	6	1	1	0.8	10	0	2	982.15	853.48	3	1	97.37	0	0	0	1	0	0	0	0	0	
26	12	1	1	10.2	9	0	2	982.1	853.25	3	1	97.39	0	0	0	1	30	0	0	4	0	
36	2	1	1	52.7	9	0	2	983	852.8	3	2	0	0	0	0	1	13	1	0	4	0	
36	0	7	1	3.6	9	0	2	984	852	3	2	0	0	0	0	1	22	0	0	3	0	
38	6	1	1	4.4	9	0	2	980.49	853.36	3	2	97.27	0	0	0	1	25	0	0	3	0	
38	6	1	1	4.3	9	0	2	980.49	853.36	3	2	97.27	0	0	0	1	22	0	0	3	0	
38	4	1	1	1.6	9	0	2	979.51	852.54	3	2	97.25	0	0	0	1	24	2	1	8	0	juvenile
38	2	2	1	32.9	9	0	2	980.61	853.61	3	2	97.26	0	0	0	1	1	0	0	5	0	cm
38	1	1	1	20.1	9	0	2	980.52	853.44	3	2	97.275	0	0	0	1	11	1	2	4	0	
38	0	1	1	0.1	9	0	2	981	852	3	2	0	0	0	0	1	30	0	0	10	0	
38	0	10	10	4.7	10	0	2	981	852	3	2	0	0	0	0	1	0	0	0	0	1	
40	0	1	1	0.5	10	0	0	984	852	2	4	0	0	0	0	1	0	0	0	0	0	
40	0	1	1	0.1	10	0	0	984	852	2	4	0	1	0	1	1	0	0	0	0	0	
61	0	2	2	0.1	10	0	3	990	849	5	2	0	1	0	4	1	0	0	0	0	1	

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
75	0	1	1	0	10	0	0	1063	841	2	1	0	1	0	1	3	0	0	0	0	0	
82	0	1	1	0	10	0	0	1090	861	2	1	0	1	0	1	3	0	0	0	0	0	
124	0	3	3	3.1	10	0	0	1049	917	1	2	0	0	0	0	3	0	0	0	0	0	polished
153	0	2	2	0	10	0	0	1031.5	876.5	2	2	0	1	0	2	1	0	0	0	0	0	
156	0	4	1	7.3	9	0	3	990	849	5	3	0	0	0	0	1	27	2	0	4	0	juvenile
156	0	42	42	4.7	10	0	3	990	849	5	3	0	0	0	0	1	0	0	0	0	0	
156	0	2	2	1.4	9	0	3	990	849	5	3	0	0	0	0	1	19	0	0	4	0	juvenile
156	0	7	7	1.2	9	0	3	990	849	5	3	0	0	0	0	1	20	0	0	4	0	juvenile
156	0	6	1	3.3	9	0	3	990	849	5	3	0	0	0	0	1	16	0	0	4	0	juvenile
156	0	2	2	2.9	9	0	3	990	849	5	3	0	0	0	0	1	4	0	0	4	0	juvenile
163	0	2	2	1.4	9	0	2	990	849	5	4	0	0	0	0	1	29	3	1	4	0	juvenile
163	0	4	2	15	9	0	2	990	849	5	4	0	0	0	0	1	9	3	0	4	0	juvenile
163	0	48	48	12.8	9	0	2	990	849	5	4	0	0	0	0	1	22	0	0	4	0	juvenile
163	0	5	3	7.2	9	0	2	990	849	5	4	0	0	0	0	1	19	3	0	4	0	juvenile
163	0	2	1	6	9	0	2	990	849	5	4	0	0	0	0	1	27	0	0	4	0	juvenile
163	0	7	2	14.1	9	0	2	990	849	5	4	0	0	0	0	1	11	3	0	4	0	juvenile
163	0	155	155	36.7	10	0	2	990	849	5	4	0	0	0	0	1	0	0	0	0	0	
163	0	6	2	113.6	9	0	2	990	849	5	4	0	0	0	0	1	17	3	0	4	0	juvenile
163	0	31	31	11	9	0	2	990	849	5	4	0	0	0	0	1	20	3	0	4	0	juvenile
163	0	74	74	28.5	9	0	2	990	849	5	4	0	0	0	0	1	30	0	0	4	0	juvenile
163	0	3	2	7.7	9	0	3	990	849	5	4	0	0	0	0	1	24	3	0	4	0	juvenile
163	0	4	2	10.9	9	0	2	990	849	5	4	0	0	0	0	1	21	3	0	4	0	juvenile
163	0	4	2	10.6	9	0	2	990	849	5	4	0	0	0	0	1	15	3	0	4	0	juvenile
165	0	1	1	0	10	0	4	0	0	2	0	0	0	1	0	1	0	0	0	0	0	west 1/2
178	0	54	54	0.9	10	3	0	0	0	1	1	0	0	1	1	4	0	0	0	0	1	
179	0	1	1	0	10	4	0	0	0	1	1	0	1	0	1	4	0	0	0	0	0	
181	0	1	1	0.6	10	3	0	0	0	1	2	0	0	0	0	4	0	0	0	0	0	
181	0	871	871	7.8	10	3	0	0	0	1	2	0	0	1	1	4	0	0	0	0	1	
183	0	1	1	0	9	2	2	0	0	1	1	0	0	1	1	4	30	0	0	10	0	
183	0	28	28	0.4	10	2	2	0	0	1	1	0	0	1	1	4	0	0	0	0	1	
185	0	46	46	0.9	10	2	2	0	0	2	1	0	0	1	1	4	0	0	0	0	1	
186	0	6	6	0.5	10	4	0	0	0	2	1	0	1	0	1	4	0	0	0	0	0	
188	0	84	84	1.5	10	3	0	0	0	1	3	0	0	1	1	4	0	0	0	0	1	
188	0	1	1	0	10	3	0	0	0	1	3	0	0	1	1	4	0	0	0	0	0	bone bead
188	0	3	3	1.6	10	3	0	0	0	1	3	0	0	0	0	4	0	0	0	0	0	polished
189	0	2	2	0.7	10	2	2	0	0	2	2	0	0	0	0	4	0	0	0	0	0	

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
189	0	103	103	2.9	10	2	2	0	0	2	2	0	0	0	1	4	0	0	0	0	1	
189	0	1	1	0	9	2	2	0	0	2	2	0	0	0	1	4	20	0	0	10	0	
189	0	1	1	0.2	9	2	2	0	0	2	2	0	0	1	1	4	11	0	2	10	0	
189	0	4	1	0.3	9	2	2	0	0	2	2	0	0	0	1	4	24	0	1	1	0	
190	0	2	2	0	10	8	0	0	0	1	1	0	1	0	1	4	0	0	0	0	1	
192	0	5	5	0.8	10	4	0	0	0	2	3	0	1	0	1	4	0	0	0	0	1	
193	0	173	173	2.2	10	3	0	0	0	1	4	0	0	1	1	4	0	0	0	0	1	
193	0	1	1	0.2	10	3	0	0	0	1	4	0	0	0	0	4	0	0	0	0	0	
194	0	8	8	0.2	10	4	0	0	0	2	2	0	1	0	1	4	0	0	0	0	1	
194	0	1	1	0.8	10	4	0	0	0	2	2	0	0	0	0	4	0	0	0	0	0	polished
195	0	6	6	0.3	10	1	0	0	0	2	4	0	1	0	1	4	0	0	0	0	1	
196	0	2	2	0.1	10	2	2	0	0	2	3	0	0	1	1	4	0	0	0	0	0	
196	0	1	1	0.1	9	2	2	0	0	2	3	0	0	1	1	4	13	0	0	1	0	
196	0	1	1	0.1	9	2	2	0	0	2	3	0	0	1	1	4	30	0	0	10	0	
198	0	1	1	1.5	10	8	0	0	0	2	2	0	0	0	0	4	0	0	0	0	0	
200	0	44	44	1.4	10	3	0	0	0	1	5	0	0	1	1	4	0	0	0	0	1	
206	0	1	1	0.2	9	9	0	0	0	2	2	0	0	0	0	4	28	0	0	3	0	
207	0	5	5	1.1	10	4	0	0	0	3	1	0	1	0	1	4	0	0	0	0	1	
207	0	31	31	1	10	4	0	0	0	3	1	0	0	0	0	4	0	0	0	0	1	
208	0	1	1	0.2	9	2	2	0	0	2	4	0	0	0	0	4	21	0	1	1	0	
208	0	1	1	0.4	9	2	2	0	0	2	4	0	0	0	0	4	24	0	3	1	0	
208	0	1	1	0.5	10	2	2	0	0	2	4	0	0	0	0	4	0	0	0	0	0	bone bead
209	0	1	1	0.2	10	3	0	0	0	2	1	0	0	0	0	4	0	0	0	0	0	polished
209	0	291	291	2	10	3	0	0	0	2	1	0	0	1	1	4	0	0	0	0	1	
210	0	2	1	0	9	1	0	0	0	3	1	0	0	0	0	4	14	0	0	10	0	
214	0	2	1	0.2	10	4	0	0	0	3	2	0	1	0	1	4	0	0	0	0	0	
214	0	1	1	0.5	9	4	0	0	0	3	2	0	1	0	1	4	27	0	2	1	1	
214	0	15	15	0.4	10	4	0	0	0	3	2	0	0	0	0	4	0	0	0	0	1	
214	0	1	1	0.1	9	4	0	0	0	3	2	0	1	0	1	4	12	0	0	1	0	
217	0	81	81	0.7	10	3	0	0	0	2	2	0	0	1	1	4	0	0	0	0	1	
222	0	24	24	0.4	10	3	0	0	0	2	3	0	0	1	1	4	0	0	0	0	1	
224	0	1	1	1.1	9	6	1	0	0	2	3	0	0	0	0	4	22	0	0	3	0	cut, possibly worked/polished
225	0	13	13	0.2	10	4	0	0	0	3	3	0	1	0	1	4	0	0	0	0	1	
226	0	1	1	0.1	10	4	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	wall fall
227	0	3	3	0	10	5	1	0	0	2	2	0	1	0	1	4	0	0	0	0	0	
231	0	3	3	0	10	3	0	0	0	2	4	0	0	1	1	4	0	0	0	0	0	

FS	Sub FS	Qty	Frq	Wt/g	Code	Unit	Feature	Northing	Easting	Layer	Level	PP V	Control	Float	Corner	Area	Element	Side	End	Taxon	Burn	Comments
232	1	1	1	1.3	9	6	2	929.3923	993.1498	2	1	95.802	0	0	0	4	22	0	0	3	0	worked bone/polished
232	0	1	1	0.4	10	6	1	0	0	3	1	0	0	0	0	4	0	0	0	1	0	
235	0	3	3	0.6	10	4	0	0	0	3	5	0	0	0	0	4	0	0	0	0	0	
235	0	105	105	0.9	10	4	0	0	0	3	5	0	0	1	1	4	0	0	0	0	1	
236	0	10	1	0.8	9	4	0	0	0	3	4	0	0	0	0	4	25	0	0	10	0	
236	0	34	34	1.1	10	4	0	0	0	3	4	0	1	0	1	4	0	0	0	0	1	
238	0	17	17	0.2	10	3	0	0	0	3	2	0	0	1	1	4	0	0	0	0	1	
244	0	49	49	1	10	4	0	0	0	3	6	0	0	1	1	4	0	0	0	0	1	
252	0	1	1	0.1	10	11	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	
253	0	13	13	0.2	10	4	0	0	0	3	7	0	0	1	1	4	0	0	0	0	1	cm, polished
253	0	1	1	0.1	10	4	0	0	0	3	7	0	0	0	0	4	0	0	0	0	0	
254	0	1	1	0	10	31	0	0	0	0	0	97.74	0	0	0	4	0	0	0	0	0	polished
266	0	23	23	0.2	10	4	0	0	0	3	8	0	0	1	1	4	0	0	0	0	1	
266	0	1	1	0.1	9	4	0	0	0	3	8	0	0	1	1	4	9	0	2	10	1	

APPENDIX VII

SHOVEL TESTS RESULTS

Shovel Test Probe	Max Depth (cm)	Stratum Depth (cm)	General Stratigraphic Description	Materials Recovered
1	70	0 to 8	I: 10YR 5/3, loose top soil/single grain, silt with sand, violent reaction to HCl	0-10 cm: 1 flake
		8 to 24	II 10YR 5/4, moderately developed angular blocky/small peds, sandy silt loam, violent reaction to HCl, lower boundary gradual	10-20 cm: 2 flakes
		24 to 55	III. 10YR 5/6, subangular blocky, silt loam/silty clay, calcium carbonate at base, violent reaction to HCl, lower boundary gradual	50-60 cm: 3 flakes
		55 to 70	IV: 10YR 5/6, weakly developed angular blocky, sandy loam, heavy caliche, violent reaction to HCl	
2	70	0 to 6	I: same as STP 1	None
		6 to 19	II: same as STP 1	
		19 to 57	III: same as STP 1	
		57 to 70	IV: same as STP 1	
3	71	0 to 7	I: same as STP 1, few sandstone gravels, bio	None
		7 to 20	II: same as STP 1, few sandstone gravels, bio	
		20 to 54	III: same as STP 1, bio	
		54 to 71	IV: same as STP 1, bio	
4	70	0 to 6	I: same as STP 1, gravels, bio	0-15 cm: 1 flake
		6 to 24	II same as STP 1, gravels, bio	
		24 to 54	III: same as STP 1	
		54 to 70	IV: same as STP 1	
5	72	0 to 8	I: same as STP 1, gravels	0-20 cm: 1 flakes
		8 to 24	II: same as STP 1, gravels	
		24 to 57	III: same as STP 1	
		57 to 72	IV: same as STP 1	
6	71	0 to 5	I: same as STP 1, sandstone, bio	0-20 cm. 1 flake
		5 to 23	II. same as STP 1, sandstone, bio	
		23 to 58	III: same as STP 1, bio top half	20-30 cm. 2 flakes
		58 to 71	IV: same as STP 1	
7	72	0 to 7	I: same as STP 1, sandstone, bio	None
		7 to 24	II: same as STP 1, sandstone, bio	
		24 to 62	III: same as STP 1, bio	
		62 to 72	IV: same as STP 1, great decrease in $CaCO_3$	

Shovel Test Probe	Max Depth (cm)	Stratum Depth (cm)	General Stratigraphic Description	Materials Recovered
8	71	0 to 5	I: same as STP 1, sandstone, bio	None
		5 to 20	II: same as STP 1, sandstone, bio	
		20 to 60	III: same as STP 1, sandstone, bio, very compact	
		60 to 71	IV: same as STP 1, caliche returns in intensity	
9	70	0 to 5	I: same as STP 1	
		5 to 25	II same as STP 1	5-20 cm: 1 flake
		25 to 50	III: same as STP 1	40-50 cm. 1 flake
		50 to 70	IV: same as STP 1, more developed, less sand percentage	
10	72	0 to 10	I: same as STP 1	0-5 cm: 1 flake
		10 to 32	II: same as STP 1	
		32 to 60	III: same as STP 1	50-60 cm: 1 flake
		60 to 72	IV: same as STP 1, more developed, less sand percentage	
11	70	0 to 5	I: same as STP 1	
		5 to 20	II: same as STP 1	5-18 cm 1 flake
		20 to 35	III: same as STP 1	18-28 cm: 1 bone
		35 to 70	IV: same as STP 1	
12	71	0 to 5	I: same as STP 1	None
		5 to 22	II: same as STP 1	
		22 to 40	III: same as STP 1	
		40 to 71	IV: same as STP 1	